# "Design of an electrical cart for malls"

Product Design Project III
2007

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The Industrial Design project titled

**"Design of an electrical cart for malls"**

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is approved for the partial fulfilment of the requirement for the post graduate degree in Industrial Design.

PROJECT GUIDE:

EXTERNAL EXAMINER:

INTERNAL EXAMINER:

CHAIRPERSON:

**Contents**

**Acknowledgment**

I would like to express my deepest gratitude to my guide, Prof. K. Munshi, for all his guidance in this learning experience with the project.

Furthermore, I wish to thank all the workshop people for being there to help .I would like to thank all my class mates for guiding me through out all the stages of my project. I would Thank to Chirag for being there all the time to support me.

Most sincere thanks to All the professors for their supports and feedbacks at every stage in the project.

I would like to thank my friends and specially Simpu and Edwin who were always there for clarifying my doubts.

Last but not the least, A special thank to Utkarsh for guiding me during making of my final model.

## Introduction

Transportation within the huge malls and supermarket is one of the area which is not been addressed. Specifically the case studies which are done here are the examples of the same. As there are no specific device designed for the transportation of the people who visit the mall.

There are electrical vehicle designed for short distance transportation .

hospitals, campus ,industries ,resorts and super malls

one is trying to analyze the existing vehicle in various use .

provide best services to customers has become a main priority for any super mall.

The need of an appropriate design which supports the situation of super mall . very tight and crowded space.

The aim of the project is to address all those issues related to public transportation within the mall, in respect to the environment within the mall. And design an electrical vehicle to be used in the super malls .

## Scope of the project :

The project will be dealing with the (utility related)

design issues of the vehicle and try to add some visual values in context to the environment of super mall. And so to explore visual design on basis of the studies.

**Methodology**

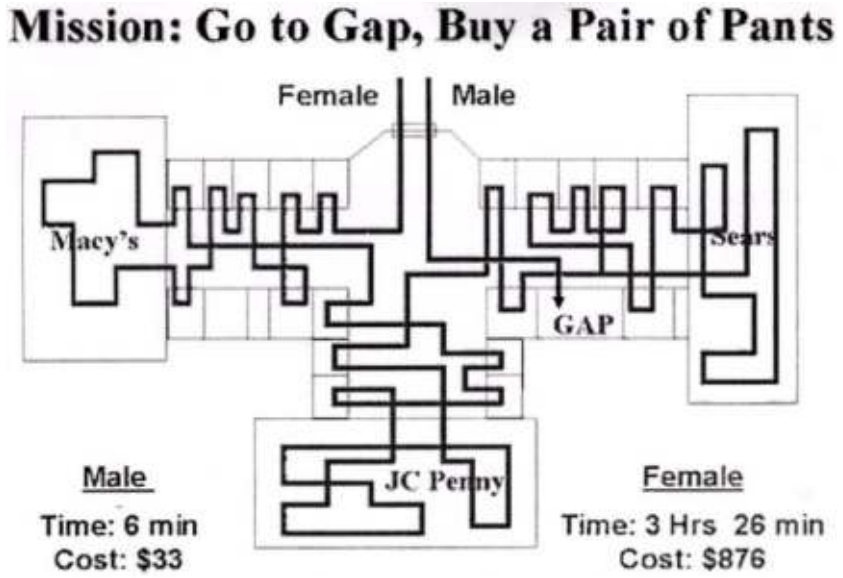
- Overall existing product studies
- Contextual studies
- Technical studies
- Inferences
- Formulating product brief
- Ideation
- Concept generation
- Explorations
- Final product
  - Mock up models
  - Full scale study model
  - Scaled model

**Objective**

The prime objective of the project is to design an electrical cart which can cater to the transportation needs for the people who come to visit the super mall.

The effort is to make the cart more compact and flexible that it can easily travel through crowd and undefined movement. By considering the fact that it's a temporary facility provided to the passengers. Which also includes the safety factor of the pedestrian and the passengers both






Female shoppers and little kids are the main target with the promotional aspects of the malls

**Why a vehicle for Supermalls?**

Existing scenario: Malls have adapted the existing golf carts in the market with various capacities for passenger carriers.
No ideal vehicle designed for this purpose.

**Design intentions**

- To improve the experience of shopping to attract more customers
- Short-distance 'shop – hopping trips' for convenience of shoppers
- Providing an easy transportation solution for the physically challenged and elderly users too
- To help the first-timer to navigate through the mall easily.

Approximate 120 malls all over India
Average floor area 150,000 square feet area (14,000) square meter

Mall is a showcase for new trends and so it gives an image of living in today or so gives a glimpse to an upcoming life .

Which has qualities of having new materials and finishes to display as a visual interests

One of the common material is found in present scenario is glass
(clear and frosted) and translucent colors

And in terms of finishes. There are more reflective surfaces and there is a play of light between glossy and mat surface.

And so one has observed more color reflections on the surfaces
The space behaves differently through out the day and during various period of time.


Vertically open spaces

Crowdy and undefined pattern of movement


Color compositions

People engross for shopping and wondering

Over looking spaces

Levels and visibilities

Interactions and dialogues between shoppers and visitor to the malls

'Large expansive spaces – I get tired roaming around one mall at the end of the day!" – Vast areas of Commercial expanse

"Previously shopping for many things at one go was difficult, malls have everything under one roof!" - Choices for the shopper have increased manifold

'I am bombarded with a variety of shops"

- Over looking spaces with different levels of transparency

" I love shopping in this air-conditioned mall especially in the hot summer"

- Controlled indoor environments.

"There are a lot of other things happening like entertainment events with promotional schemes".

- More interactive environments with in-your-face advertising.

"If I want to buy a gift at short notice, I would like to see all possible options in a short time"

- Easier navigation within the malls, highlighting zones is needed

"The In-orbit mall is so huge, I cant cover all shops in one day"

- Quicker look at all shops in the mall is needed.

**Personal perceptions of super mall**

Super malls are like a community which exist putting all small shops together in one place .

Characteristics : ` Huge' can be the word for it.

Its very spacious

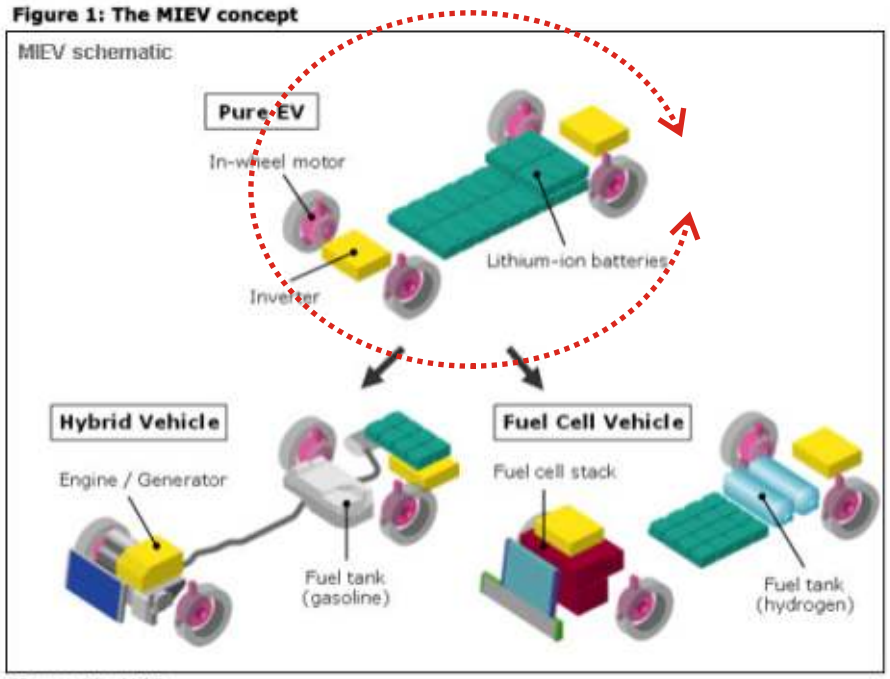
The pattern of movement is very undefined.

People walk in the mall and wonder around to see the new products ,or to buy stuff ,for entertainment ,food .people come here to utilize good time with family ,friends or relatives .

The quality of the mall includes very bright and lit up area .all the shops are visible from one point to the other. Amount of transparency provided by the organization helps one to get more visual interests. The overall visual interest includes a composition of various colors and shades It also gives an overall idea of where world stands today and what are the new products and technologies are into the market. It also gives a glimpse of new trends and fashion.

For kids it's a fun space. where they find their interests in a huge amount.

**Figure 1: The MIEV concept**




*(Source: Mitsubishi)*

BEVs were among the earliest automobiles, and are more energy-efficient than all internal combustion vehicles.

BEVs produce no exhaust fumes,

minimal pollution if charged from most forms of renewable energy.

Many are capable of acceleration exceeding that of conventional gasoline powered vehicles.

BEVs reduce dependence on petroleum, may mitigate global warming by alleviating the greenhouse effect,

are quieter than internal combustion vehicles,

Modular EV Batteries by exide- prestolite

PML Flight link Dc Motors

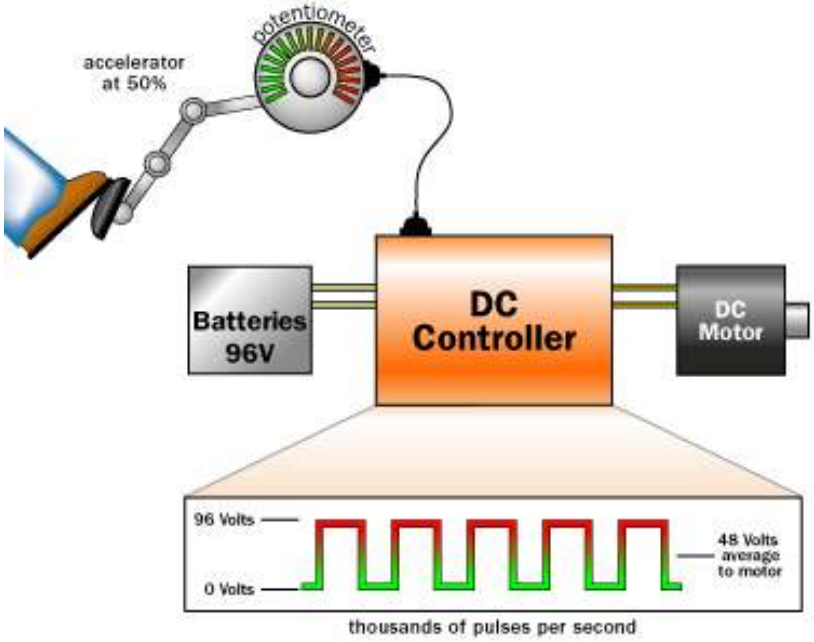
GEM Electronic controller

Battery charger

Display units

The heart of an electric car is the combination of:

- The **electric motor**
- The motor's **controller**
- The **batteries**






"Electric cars are driven by large electric motors usually rated between 3.5 and 28 horsepower. For those accustomed to gas engines, this may not seem like much power, but the rating systems used for gas engines and electric motors are so different that the numbering system is almost meaningless. Gas engines are rated at their peak hp, electric motors are rated at their continuous hp. The peak hp of an electric motor is usually 8 to 10 times its continuous rating."

Http://auto.howstuffworks.com/electric-car.htm


| Air port | Things to carry |
|---|---|
| Almost all kinds of people | Baggage |
| Kids | Laptop |
| Adults | Purse |
| Physically challenged | Office bags |
| Air hostesses | Vanity box |
| Internal staff members | Camera bag |





Approx volume : 450x 300x200 in mm

Study of various existing use of an electrical cart in various contexts like in airports, institute, resorts, golf fields or in super malls and also one has identified the users and what all they carry along with them while traveling in the cart

One has also identified approximate volume of the luggage they carry along

## Campus car

INSTITUTIONAL OR COMMERCIAL USE

- STAFF MEMBERS
- EXECUTIVES
- VISITORS
- KIDS
- PHYSICALLY CHALLENGED

THINGS THEY CARRY

- LAPTOP
- OFFICE BAG
- TIFFIN
- FILES AND FOLDERS
- BOOKS
- COLLEGE BAGS

APPROX VOLUME : 550 X 300X200 IN MM

## Golf

- Industrialist
- Business man
- Executives
- Majestic
- Royal

## Things to carry

Golf kit

- gloves
- shades
- water bottle
- golf kit bag
- extra pair of shoes

Approx volume for golf kit : 1200 x 400x400 in mm

Approx volume for a small kit : 300x200x200 in mm

**Super mall**

Almost all kinds of people

Visitors

Kids

Physically challenged

Family

Window shoppers

Shoppers

**Things they carry**

Shopping bags

Gifts

Food packages

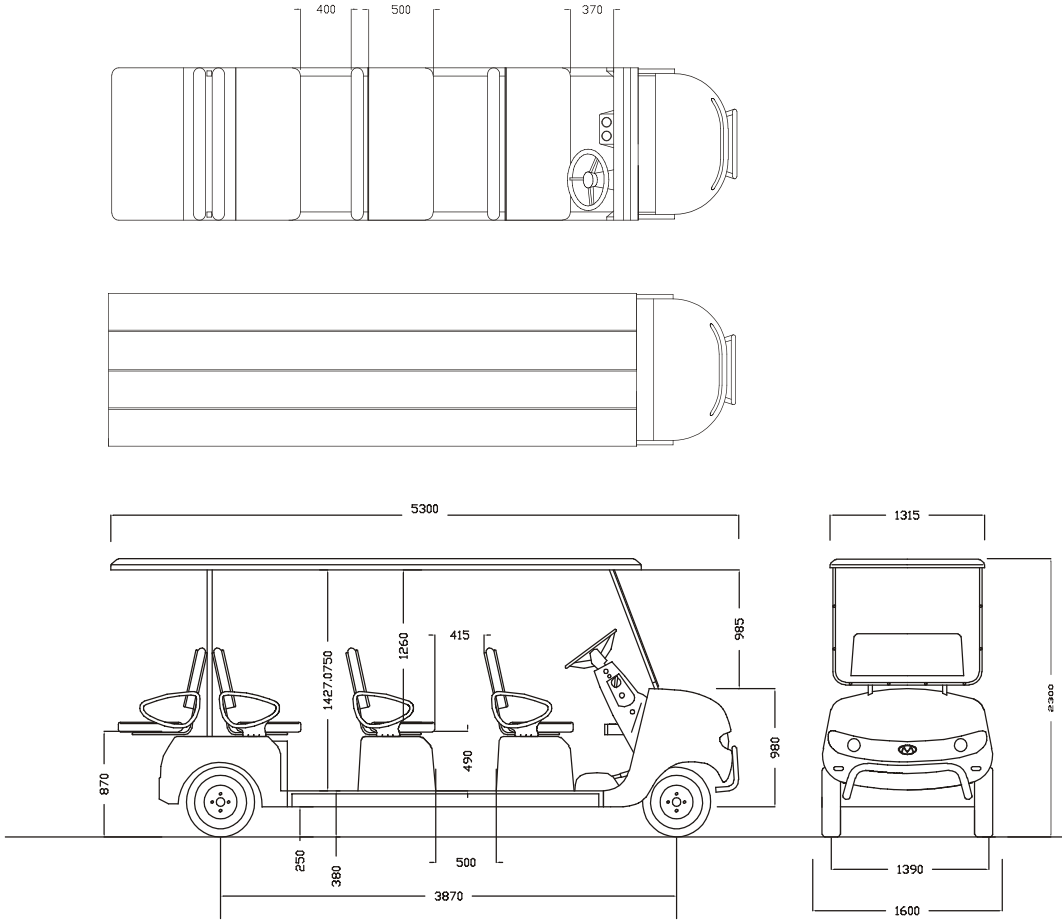
Baskets

Purse

Cold drinks or water bottles

Carry bags


Approx volume : 550 x 300x200 in mm




Maini Materials Movement Pvt. Ltd. (MMM), is an ISO 9001:2000 certified company belonging to the Maini Group and based in Bangalore, India

8 Seater MUV


**Electrical vehicle for Super mall**

Transferring people from one place to other

Average people travel in a day are maximum in number of 150 to 200 max.

Constant use of this vehicle is during time between 12 noon to 9 pm in the night

Maximum use of the vehicle is from 5 o clock to 9 pm in the night.

•Full Dash Board

Made from ABS is almost scratch proof.

•Direction Control
Conveniently located FNR switch on the steering stem makes it easy to drive

•Hand Brake
Additional protection besides the 4 wheel braking system

•On Board Charger
Convenience of charging at any location.

**Specifications ..**

| | |
|---|---|
| Battery : | 8 X 6V, 175A |
| Drive Motor : | 4kW, 3900 rpm, 48 V DC Sepex Motor |
| Tyres: | Tubeless (4PR Rating) 22 Psi- 18 x 8.5 x 8 |
| Speed (kmph) : | 20 |
| Pay Load (kg): | 800 |
| Ground Clearance (mm): | 130 mm at the lowest point |

**Neptune builder complex, Bhandup**

The vehicle is used by staff as well as by workers and employees, to move from one office to another.

At the stops all the securities have walkie talkie and he passes on the message to the driver to go to the other stop .

Sometimes there is only one passenger to travel from one place to other

He takes 20 to 25 rounds in a day

Which is almost like 10 to 12 kms a day

There is some provision provided to the driver next to the steering for him to keep water bottles ,cleaning cloth or tools.

The horn is provided next to the leg

Battery charge indicator placed little far from the visual access that one can not easily see how much charge is left.(drawback)

**Advantages**

Produces low noise

its an open car.

useful for aged people to move from one place to other.

For people who are carrying too much of shopping bags or luggage

It's like a toy train for kids and so it's a main attraction for them.

Speed limit is only max to 25 so it's safe for the pedestrians

The back most seat is the main attraction for the kids.

**Disadvantages**

Too much use of brake

Horn is placed below and so operated with leg.

Roof is Blocking the view of other shops in the building on upper floor

As being a special attraction for kids there are no such concerns in terms of extra space for kids or any extra provision for kids to seat.

Too long and straight body and so it cant pass or take easy turns in turning junctions.

Sometimes people just barge in ,so it become over weight and so it runs slowly which might affect its performance and so it consumes too much of battery.

No provision of storage to keep the luggage or shopping bags

To stop the cart, passenger has to shout or wave to the driver,

So even when they want to get off from the cart

**Why Supermalls?**

- Sudden boom in the market of "Malls" as a concept in India
- Increasing competition between the malls in India to attract more shoppers
- Quality of service provided by the malls is a premium factor of stiff competition
- Cut-throat efforts with strong promotional campaigns and advertising to lure more customers
- Owing to the economic surge in the buying capacity of the working youth in major metros all over India, Malls are now more of a social hub than a shopping experience.

**Highlights of the interviews**

Currently using 8 seater golf cart manufactured by Maini eleclric vehicle manufacturer.

There is a need for moving vehicle within the super malls for :

Service

Luggage transportation

Security officers

Passenger transportation

It's a useful vehicle for:

person on a wheel chair ,

people carrying their kids in stroller,

aged people for whom its difficult to walk for longer distance. People who come only for window shopping to take a look around, people who are carrying lots of shopping bags or other heavy stuff and also the parents with their kids.

Average people travel at one time are in number of 8

3 kids out of 8 people

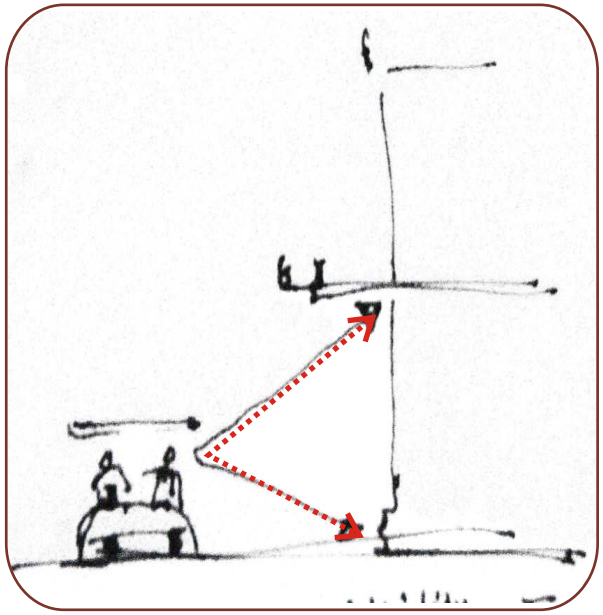
2 aged people out of 8 people

3 or 4 number of people who are carrying shopping bags.

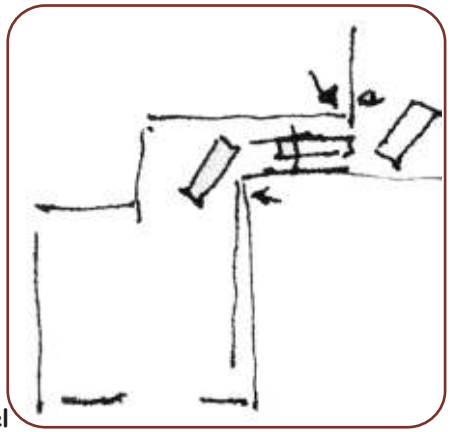
*The person on wheel chair is 1 out of 500 people in the mall

*The average time one person travel by cart is approximately 5 minutes.

*The activity of ingress and egress happens in this vehicle approximately 800 times in a day.



Present situation at Nirmal life style,Mulund



Present situation at phoenix,parel

**Observations**

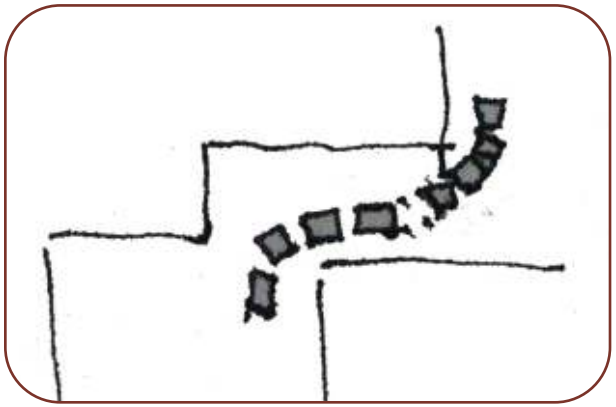
The cart should be open that it gives more visibilities to the other part of the mall.

The width of the cart is too small in respect to its length and so it vibrates more when u increase the speed .

The length is too much and so taking turns is not easy in crowdie situations.

**Inferences**

The design does not include covering on the cart
The design includes modular design and so flexible from the junction part in between two modular that it can easily move through the traffic and also from small and complex junctions

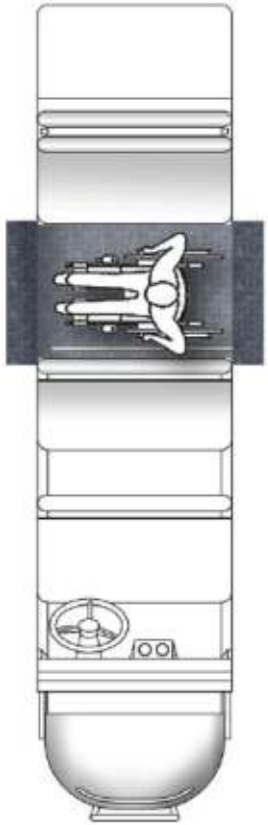


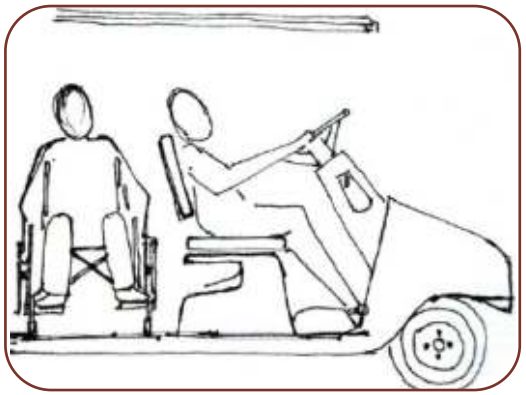
Schematic diagram for one of the issues

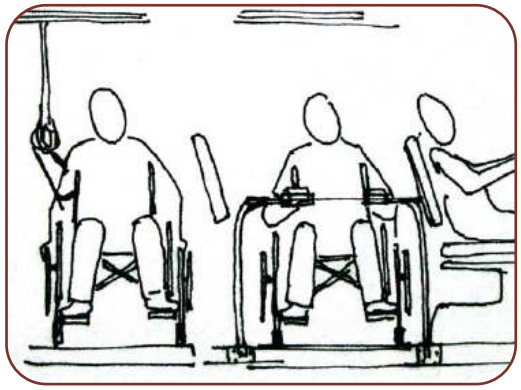
No provision for physically challenged people

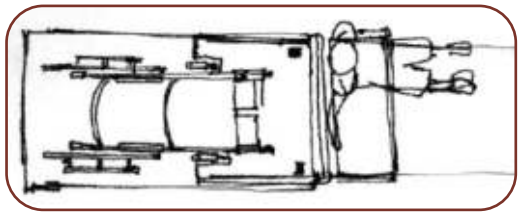
No provision to put extra stuff or the luggage

No place to put cold drinks or any bottles









Various possibilities for easy accessibility and safety factor included.

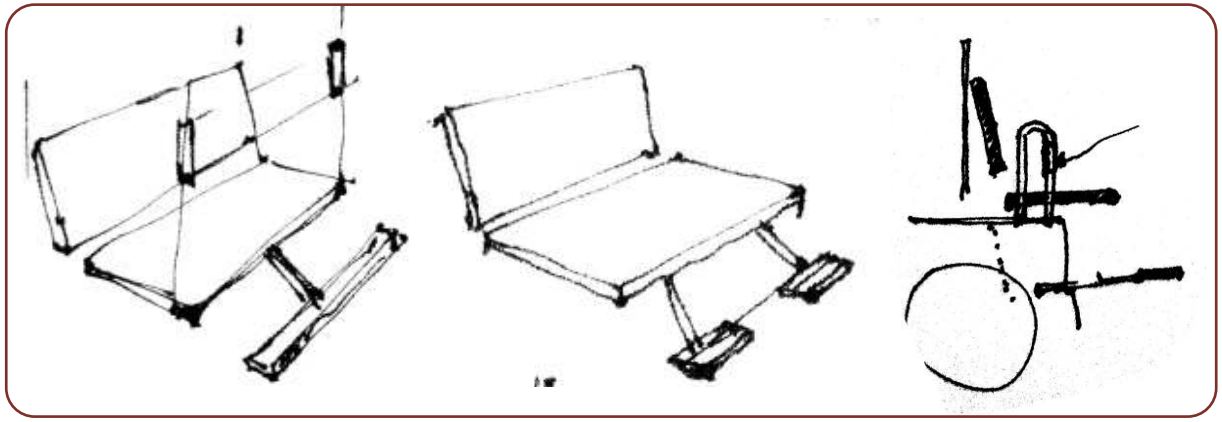
One of the possibility is to provide the space for physically challenged person closer to the driver so that he can communicate to him and ask to stop where ever he wants to get down

He can access from the side and he can get down from the other side.

One of the idea is to provide some handle bar closer to him that he can hold on to .

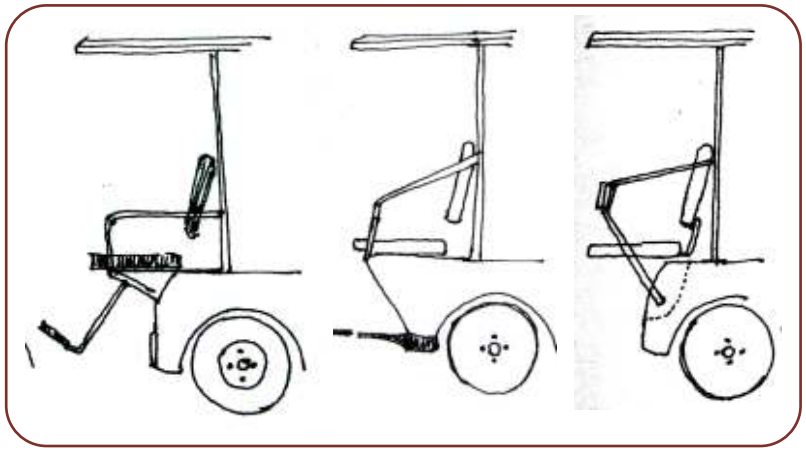
Out of all the ideas one closer to the driver is selected as the final one and one is taking it further for development.

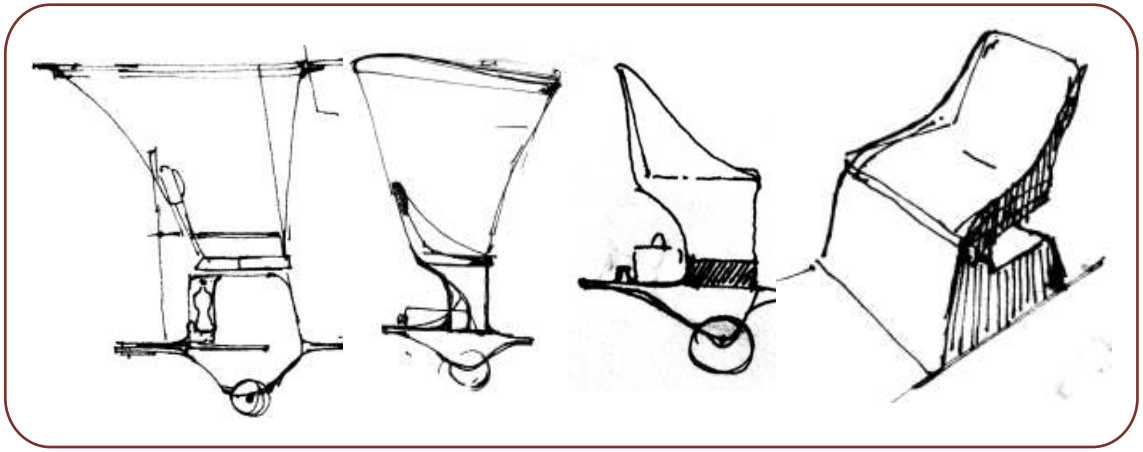
One can provide handle bar on the back rest that he can hold on to



Initial ideas concerning the issues that one has identified from the contextual studies. Providing handles on the sides, as when the cart immediately starts there is a force on the opposite direction so the person might fall off from the seat.

Even providing a leg support person can push him self in the opposite direction providing force on the foot rest.





One of the idea is to make the entire system modular including seat ,roof battery space below the seat and entire module is rested on the wheels. some more space next to the leg to put their shopping bags.

**Product brief**

Information collected is analyzed here to come to a product brief which could help in designing a suitable vehicle that caters to the needs of the super mall

The section is divided into the following chapters:

1. Identification of user profile -product Profile.

2.overall requirement of the vehicle in terms of the parts and extra features.

3.Technological specifications

**On basis the layout is selected**

## Technical specification

*Maximum speed of 15 km/hr

*Total discharge time of 8 hours

*Overall load capacity

*Accommodate 1 driver and 7 passengers(+ extra luggage or carrying bags

## Details of components to be used in the vehicle

*Batteries:8 X 6V, 175A , 6 number of them ,300 kg weight ,placed easily accessible

*Hub motors

*Controller

*Tyres : Tubeless (4PR Rating) 22 Psi- 18 x 8.5 x 8,Alloy wheels

*FRP body panels

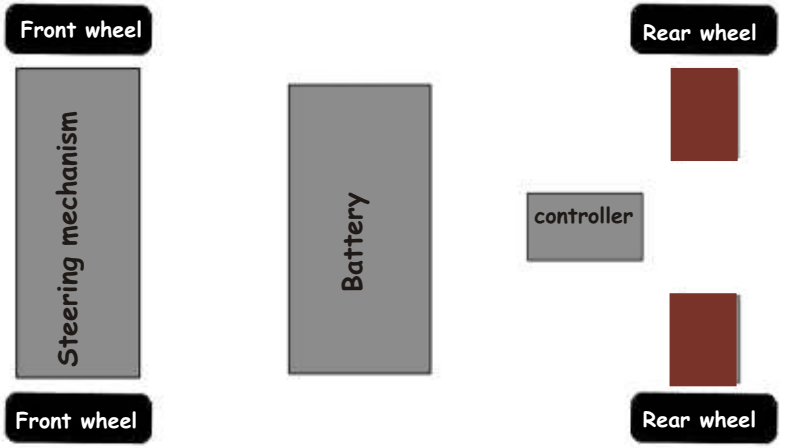
*Steering :Right hand, Rack and Pinion

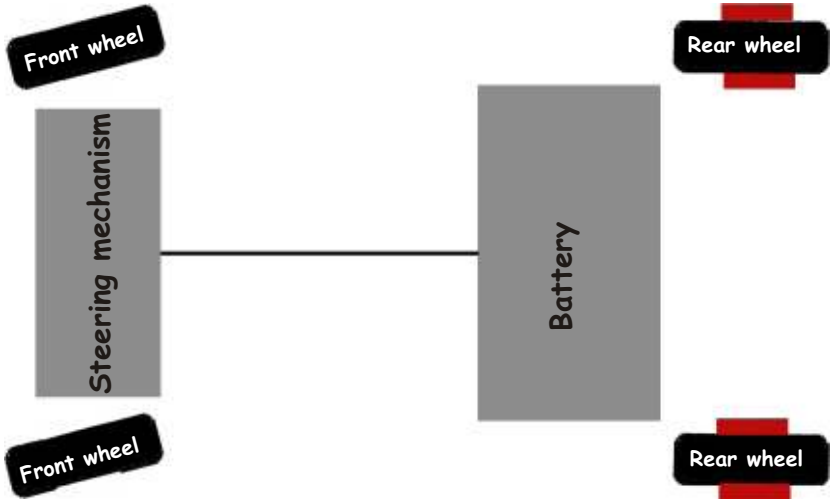
*Turning radius 5500 mm

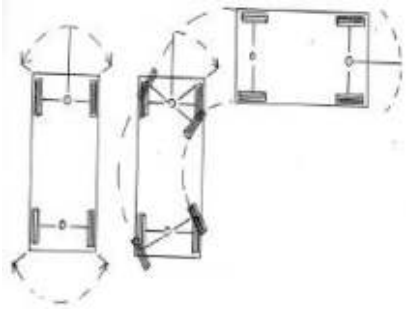
*Ground clearance 100 mm

*Pay load 800 kg

*Electronic speed controll:48V, 400A



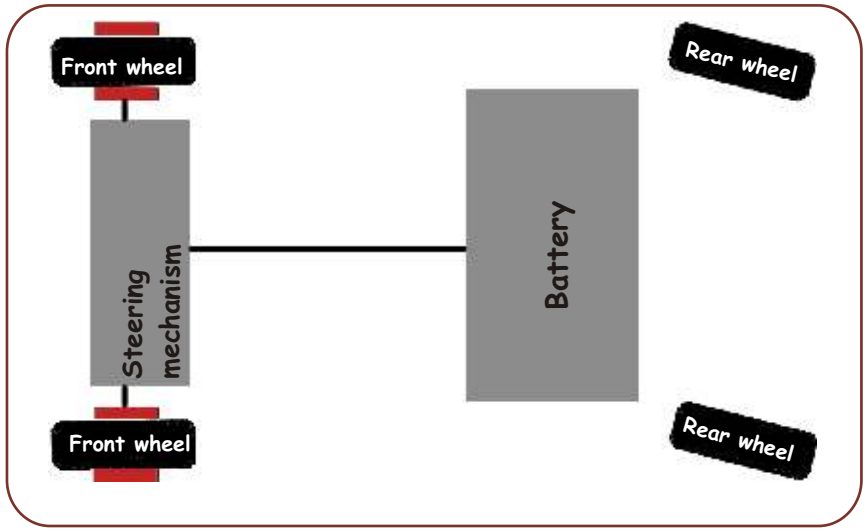



Mechanism:

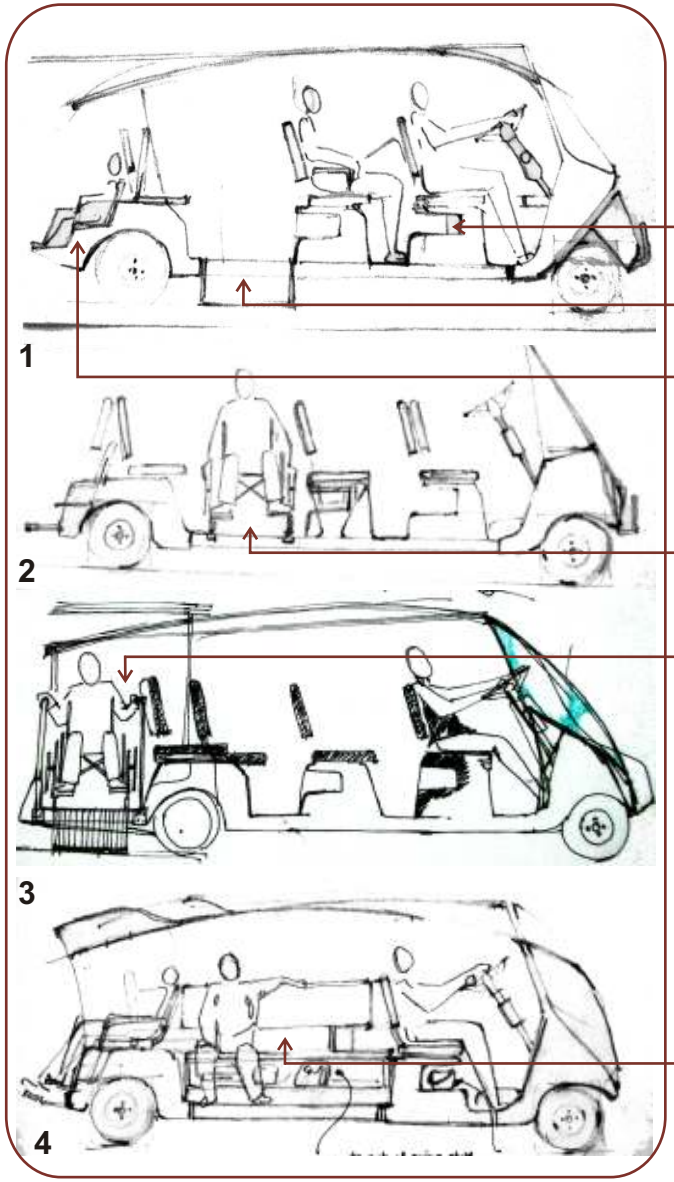
-Linked steering mechanisms on front and rear axles enable unit to track the tire tracks closely of the pull vehicle

-The sharpness of turning is limited to under 45 degrees




This 4 wheel steer cart allows a series of carts to be linked in a train. All carts in the train will follow the path of the first cart.

* Its indoor use so it has to be non air polluted
* Electrical operated vehicle Seating capacity 8 seater Seat that allows to seat only
* limited passenger not more then 8+extra baggage they carry.
* Overall dimension Compact enough to pass through tight lanes.
* Size not more then approx : 2670x1190 x 1800in mm
* Range between two charges be enough to complete minimum 8 hours for one charge
* Cruising speed be between 10 to 15 kmph
* Body modular system and extra space for bags and other stuff with its own individual mobility.
* Plastic (FRP) panels which will be strong enough and light weight and also easily mounted on to the chassis.
* Two people on one module .
* seats will be non reclaimable as the travel duration is not long enough.
* One last module for adults ,person on wheel chair and people carrying stroller or the trolley and so it will have foldable seat that it can be fold back if any person wants more space for accessability
* Easy moving in difficult turning
* extra space closer to the driver to put his personal belonging like , Paper, tools,c loth, water bottle




To put personal belongings like shopping bags ,or carry bags or purse

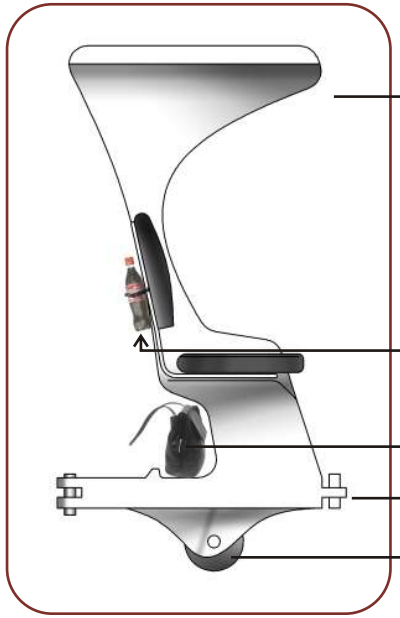
Ramp coming from the cart

Rear seat for the kids with a small seating.

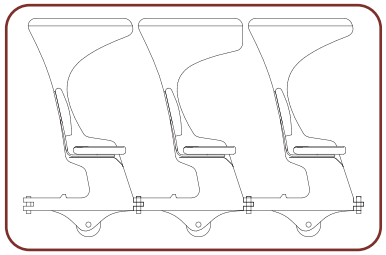
Second last seat for accessibility. And so it has more leg space.

Image showing the rear most module given for the accessability.

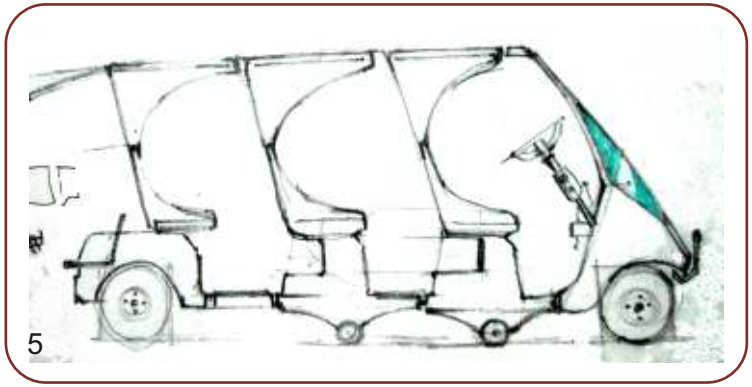
The middle most seats are provided to seat side ways ,providing that person can have better view of the shops and get down immediately.




Single module for two person next to each other



3 modules together attached to each other with a flexible joint

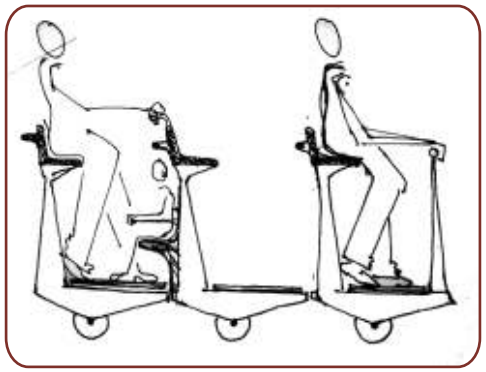



The entire module can be roto molded and it can be mass produced

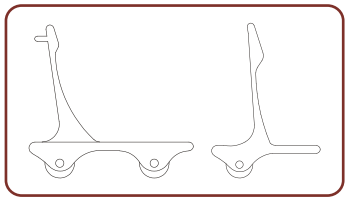
After evaluating all the ideation the idea number 5 is chosen to develop further.

The concept is developed on basis of designing a cart which can move easily through the traffic and also there is an effort to make it more compact and short as compare to the existing study model.

Overall concept with 3 modules with a small seat behind the cart for kids. The modular design gives flexibility to the choices where one can attach or remove the module as per number of people required.



A high seating just to lean on and a space to put the luggage some space near to leg room to put extra stuff



Ideation

A passenger cart for various possibilities to put their stuff and also extra low seating space for kids.

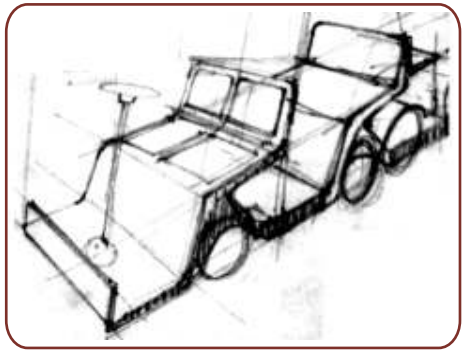
As the traveling is not more then 5 minutes(evarage) per person .There is one more idea worked out to provide a platform where person can just stand and its going to help decreasing the space that one person required on the cart.

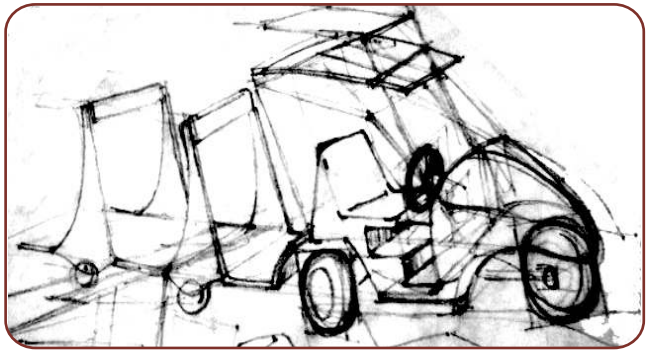
A high seating provided for a temporary resting.

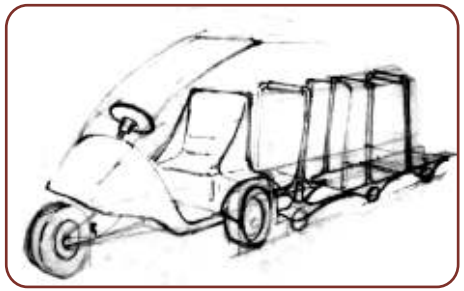
A handle bar provided on the front module

Each module will be having a castor wheels so that it can even move on undefined path.

A rubber mat is provided for better grip.







The idea of providing platform to the passengers where they can stand ,as the travailing time is very temporary not in an average (5 minutes).

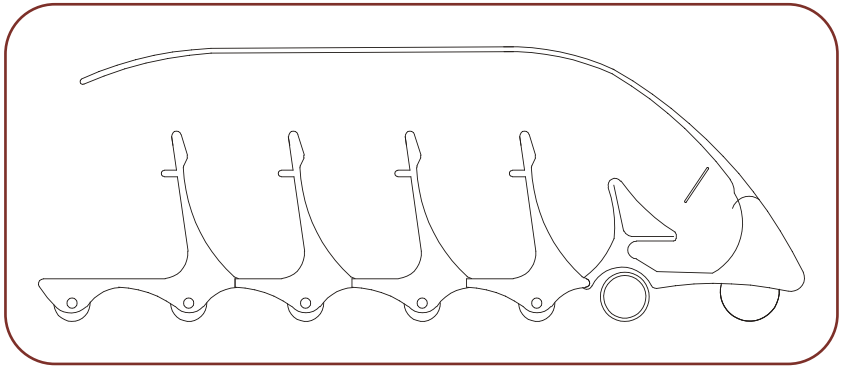
Few ideas where the front car for the driver can me a compact module on three wheels .having a shade on top it

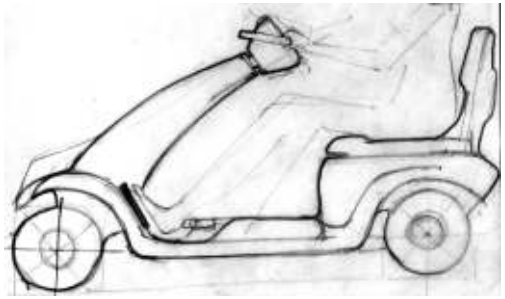
Then all the other trolleys attached to it as per capacity of the passengers .

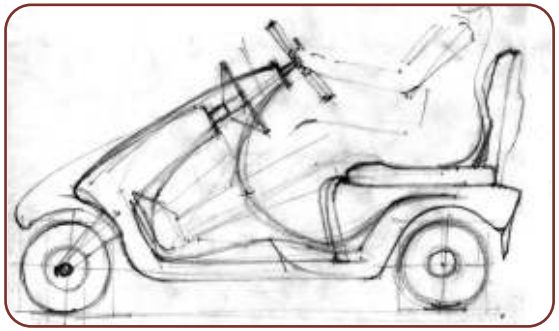
Where it can have a back rest and a small projection from the arm rest side as shown in the figure number 4,And some space below to put the belongings

The module in front will have an handle to hold on to behind the back rest.

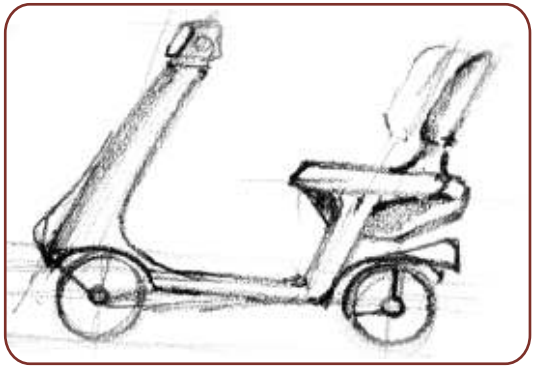
The concept is developed further by including all the ideas mentioned above and also providing the last module for accessibility.

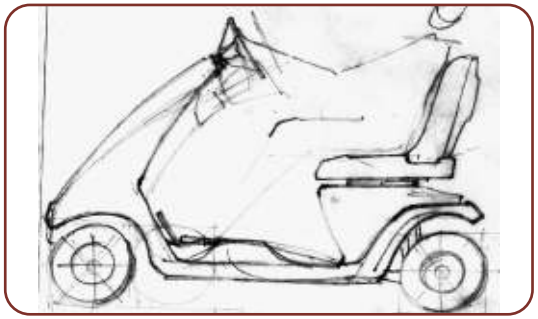


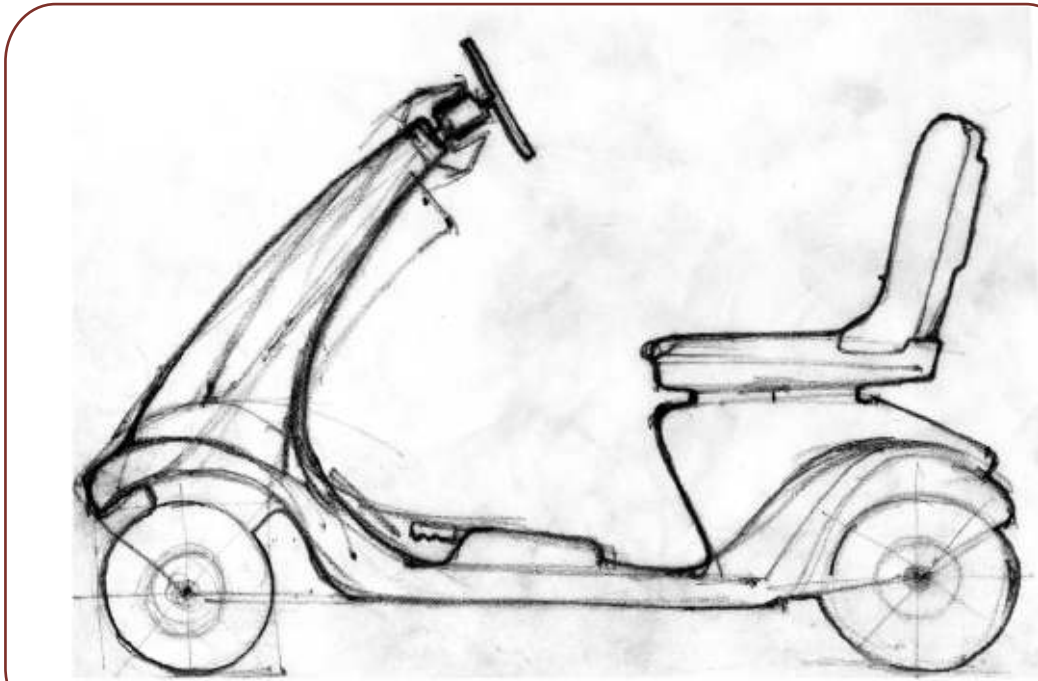




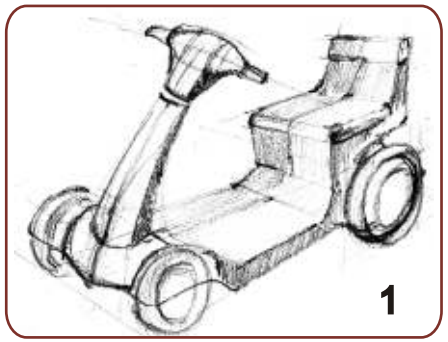
Clusters are to show various possibilities of the relation between steering ,legspace and the seat in respect to the comfortable posture

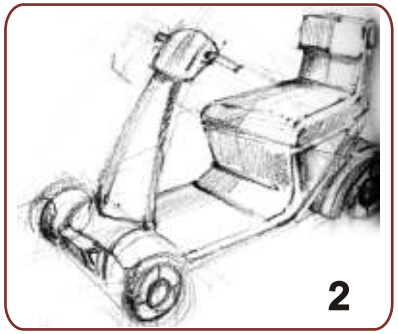


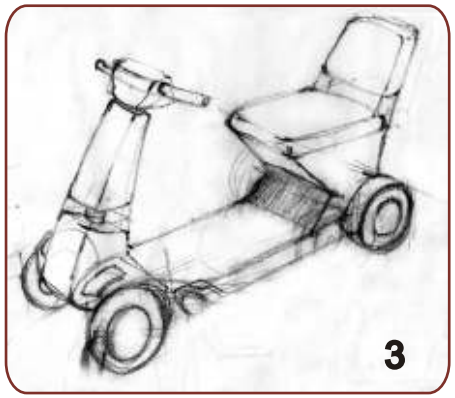


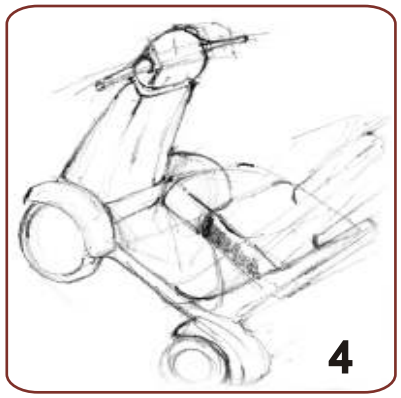


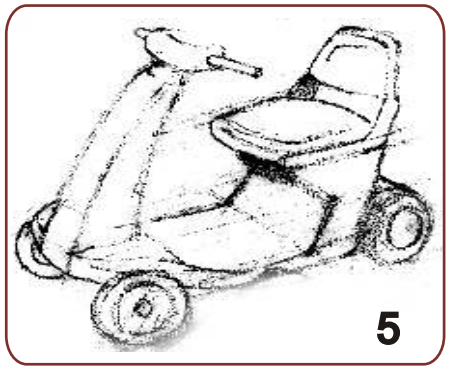
Ideation

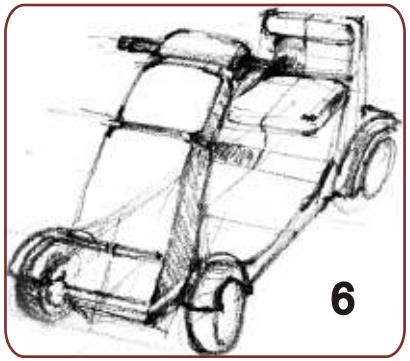


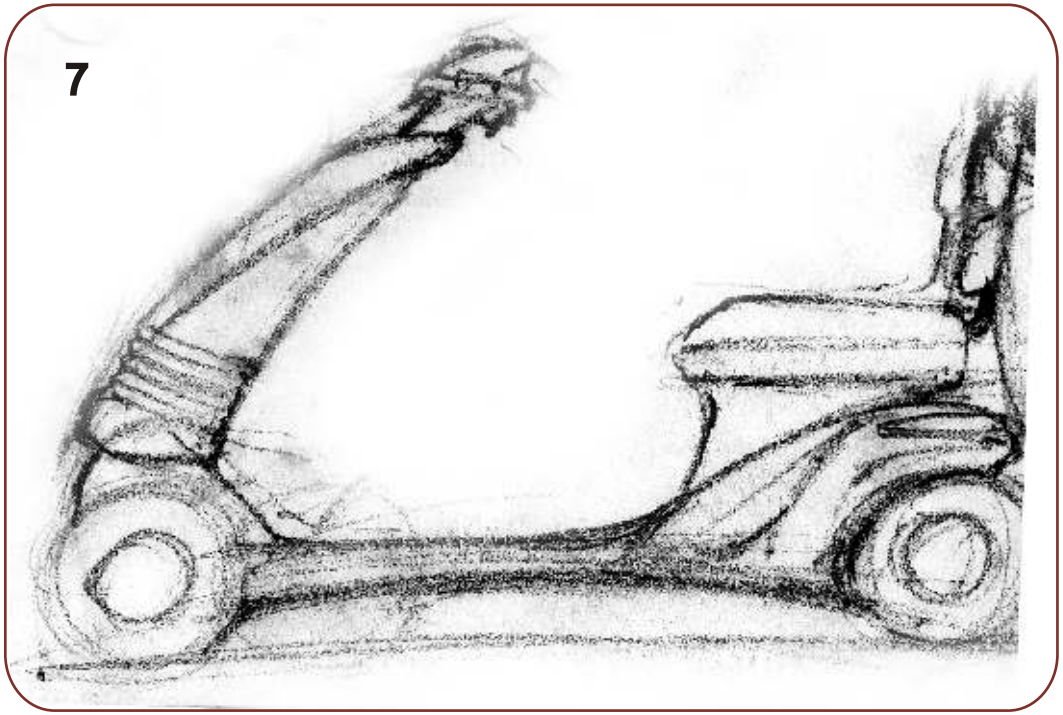



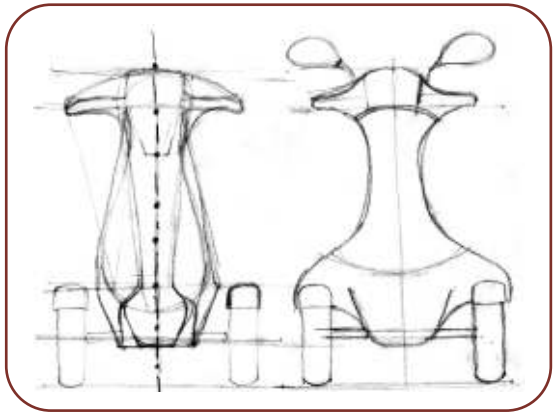

Initially one has trying to design a single seater for a driver which will be attached to the main passenger cart the form is derived from the product brief where it includes all the requirements that are identified from the user studies.

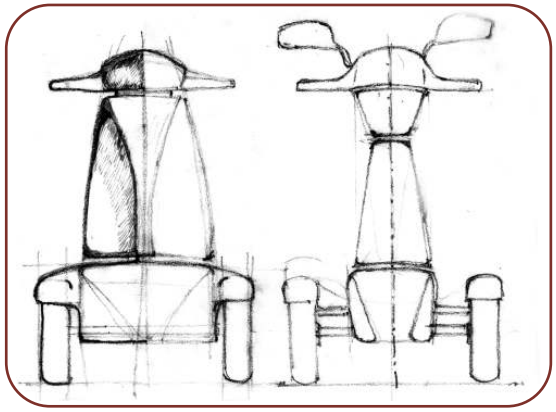
The main factor of vehicle being adoptive to any size of user.

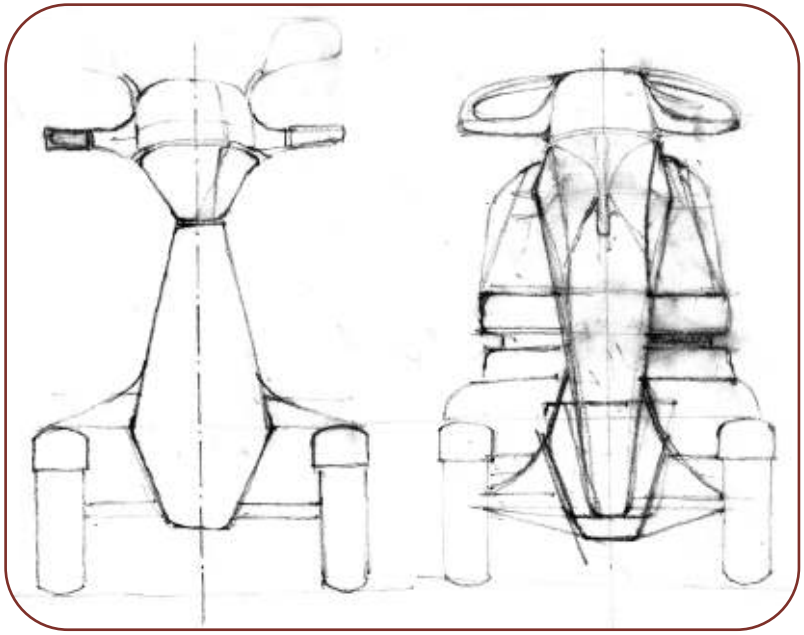
And so on all the aspects idea 7 is been selected for further development of the concept.

Concept is flexible enough to adopt any kinds of color scheme related to the context it is been used

Driver car has provided flexible steering and also the seat which can be pull in the front and also can push back.This entire idea is to provide design with a flexible system as the vehicle is going to be used by various kinds users.

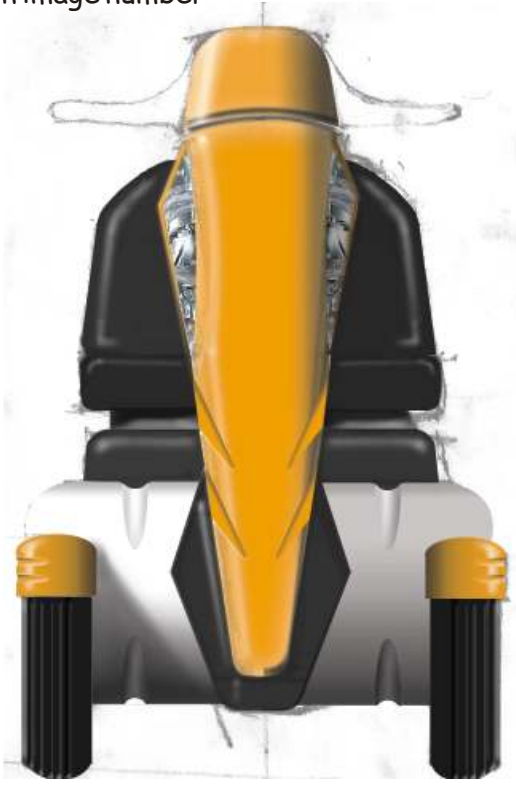


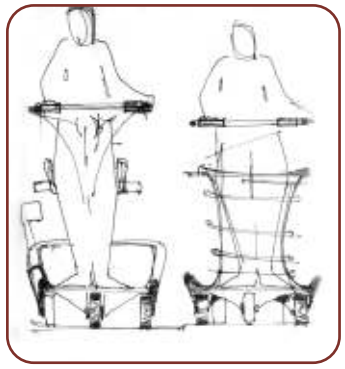


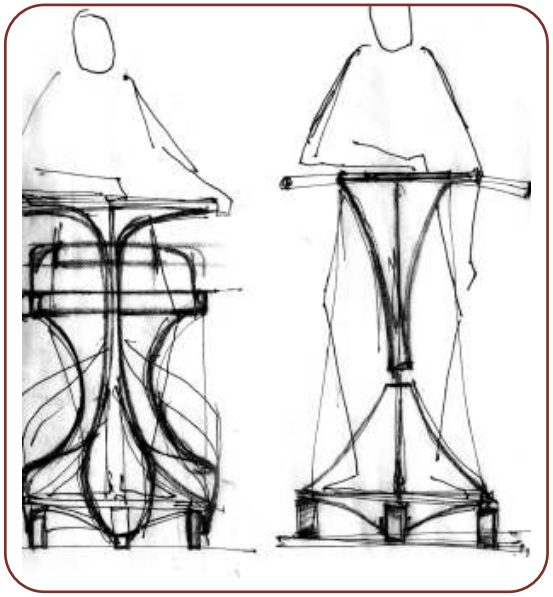


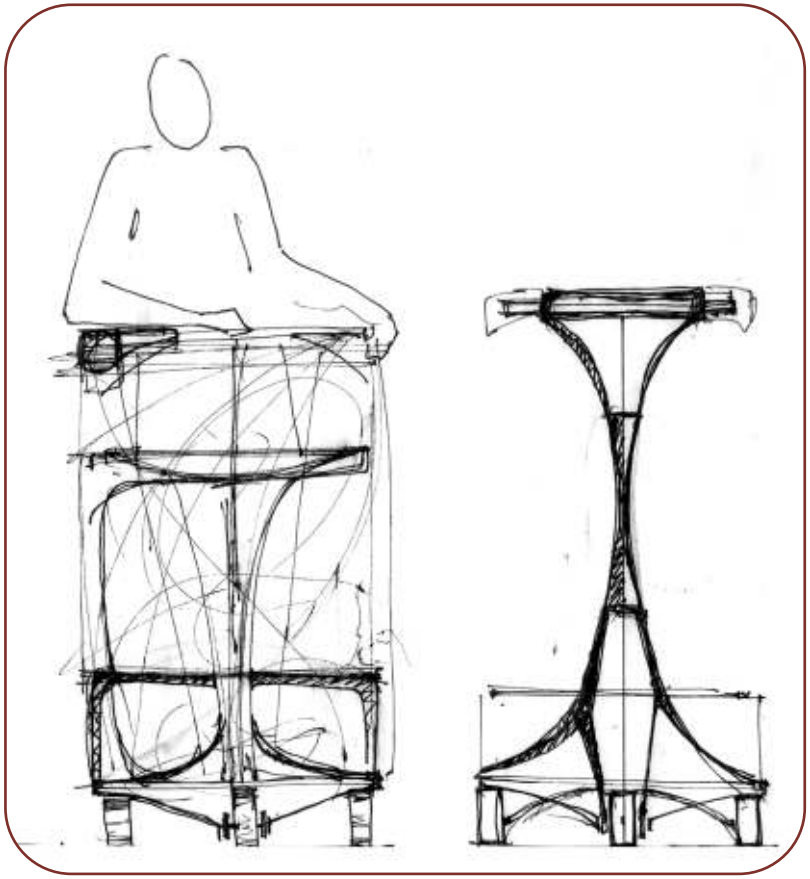
Various possibilities tried out for the front elevation of the cart

Initially one has trying to make the driver car a single seater. And so with identified dimensions and requirement of the size one has arrived to one of the concept as shown in image number ----



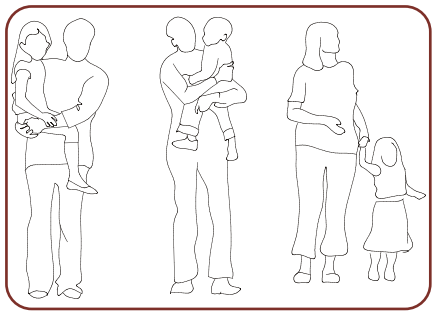


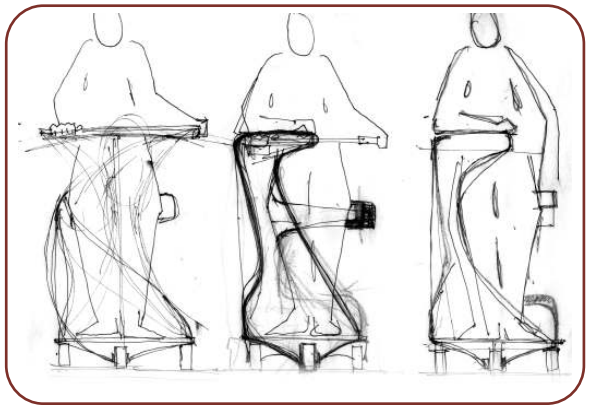




Various possibilities worked out for a passenger cart in respect to the posture study that has been done and few identified postures are taken as a reverence for designing.

**A small study of how people carry their kids and come to visit the malls**

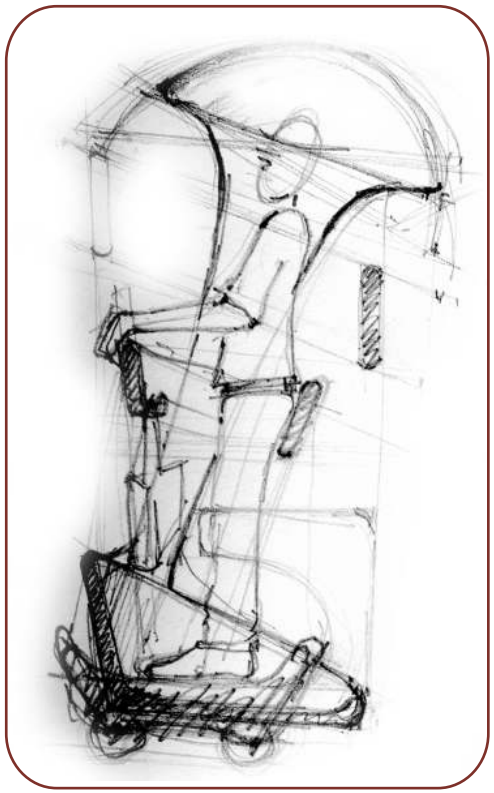


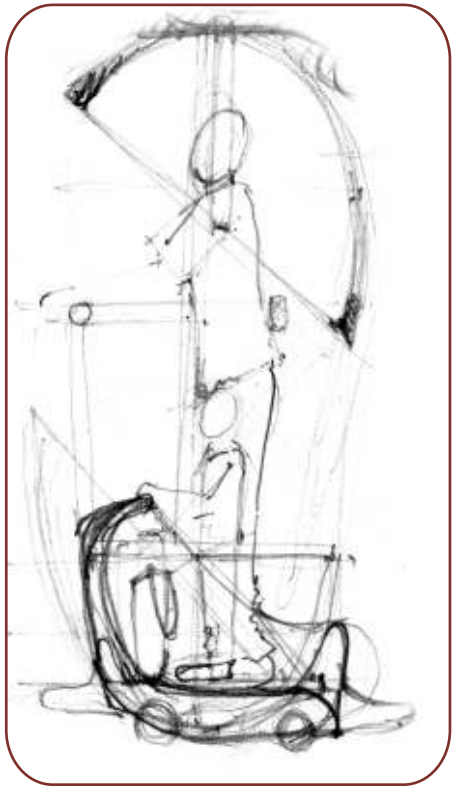


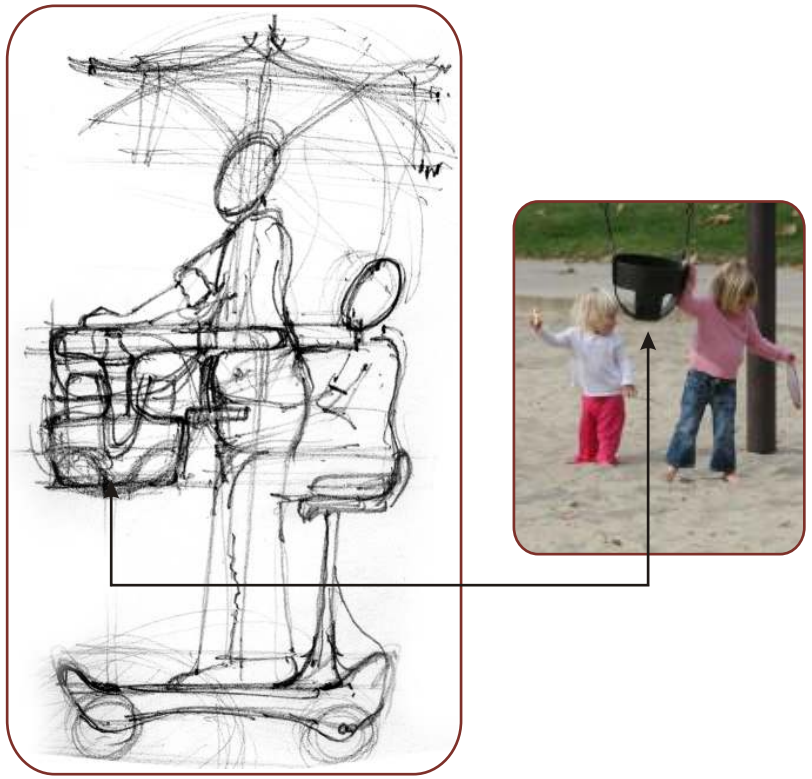
Carrying in their laps ,on the shoulders ,inside the stroller or kids walking individually,But in all the case kids need to be closer to their parents

RIG USED FOR ERGONOMIC STUDY

Mock up rig showing the minimum area required for a single person to stand







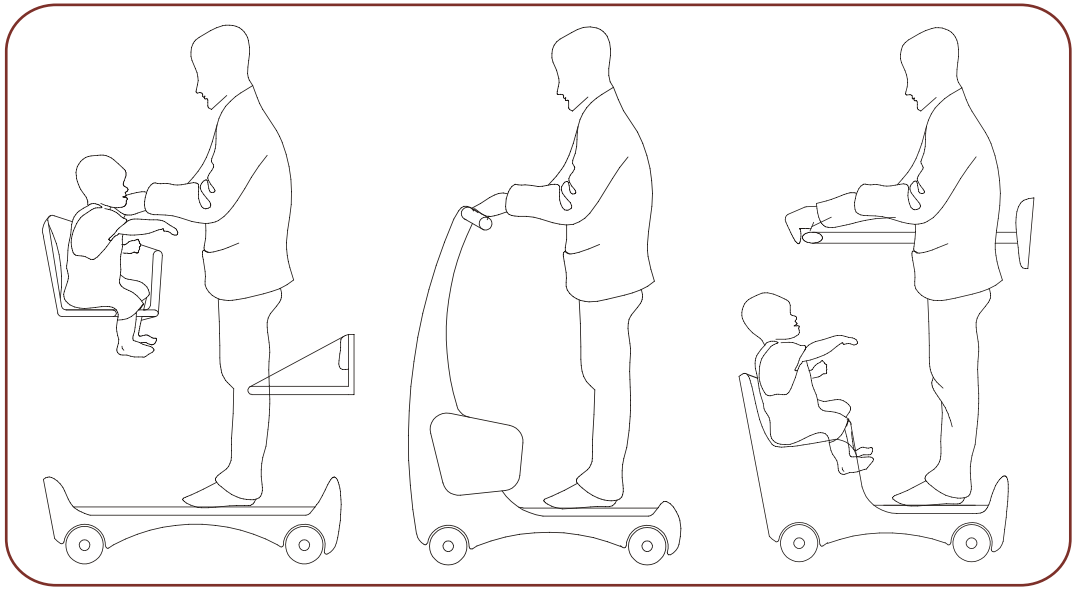
One is trying to explore various possibilities of passengers' cart

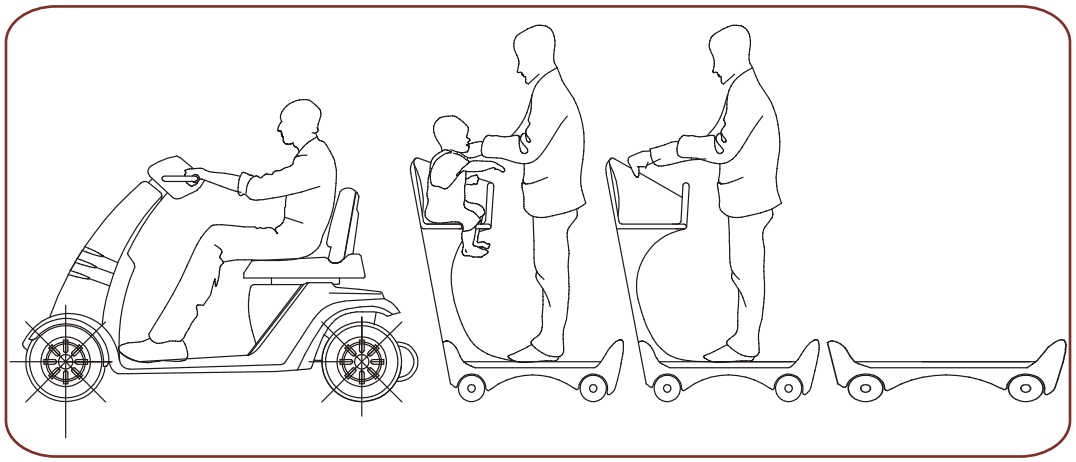
Providing a temporary structure to prevent one from the shade  or rain

A small railing for a kid to hold on to

Image 3 is trying to explain about a small baby carrying bag attached on the cart where u can even put your shopping bag ,which will be provided on the side

And also a high stool for a temporary seating





The concept where it includes driver car and attached passengers cart .passenger cart has various ideas as shown in the images 1,2 and 3.

First drawing explains about a possibility of providing a space where one can put their stuff in the space given in front of them or they can put their kid. And the kid also remain closer to their parents. one can just lift the kid or their shopping bags or any personal belongings from the seat and get off from the cart. The image shows a provision to seat which is small in width as there is no long distance journey.

Second image shows a provision to put their personal belonging which is very closer to their legs and a high column which has handle included that the passenger can hold on to a small platform on which person is standing.The platform also has small castor wheels.Which are drags by the car in front.

Third image shows a small kid chair below where passenger can also use it to put their belongings a small handle on the side and a back support at a lumber level .

If there is any instant brake then that acts as a support and stops the person from leaning back.

After coming down to design brief one has identified 3 concepts out of which the one which houses maximum deign implications will be developed further. From the objectives as mentioned before concept should have solved all the utilities based issues.

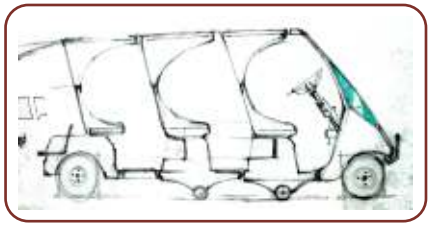
Multi applications in terms of its use ,aesthetically appealing that it gives an impression of the context that it is used.

And major aspect of the concept being compact in such a context is also very important.

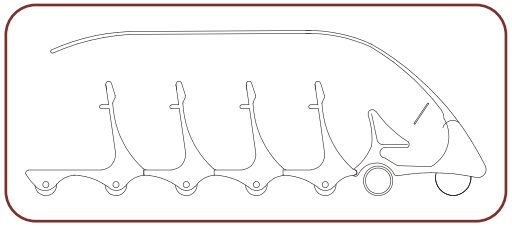
The concept should also be flexible enough to move withing the undefined pattern of movement within the mall.

So all the concepts below are evaluated on the basis mentioned above.

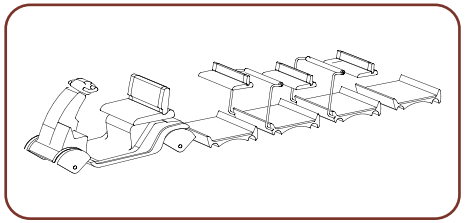
Concept evaluations are done with the supports of the users (drivers and passengers both)taking their personal opinions about the design.



Concept 1



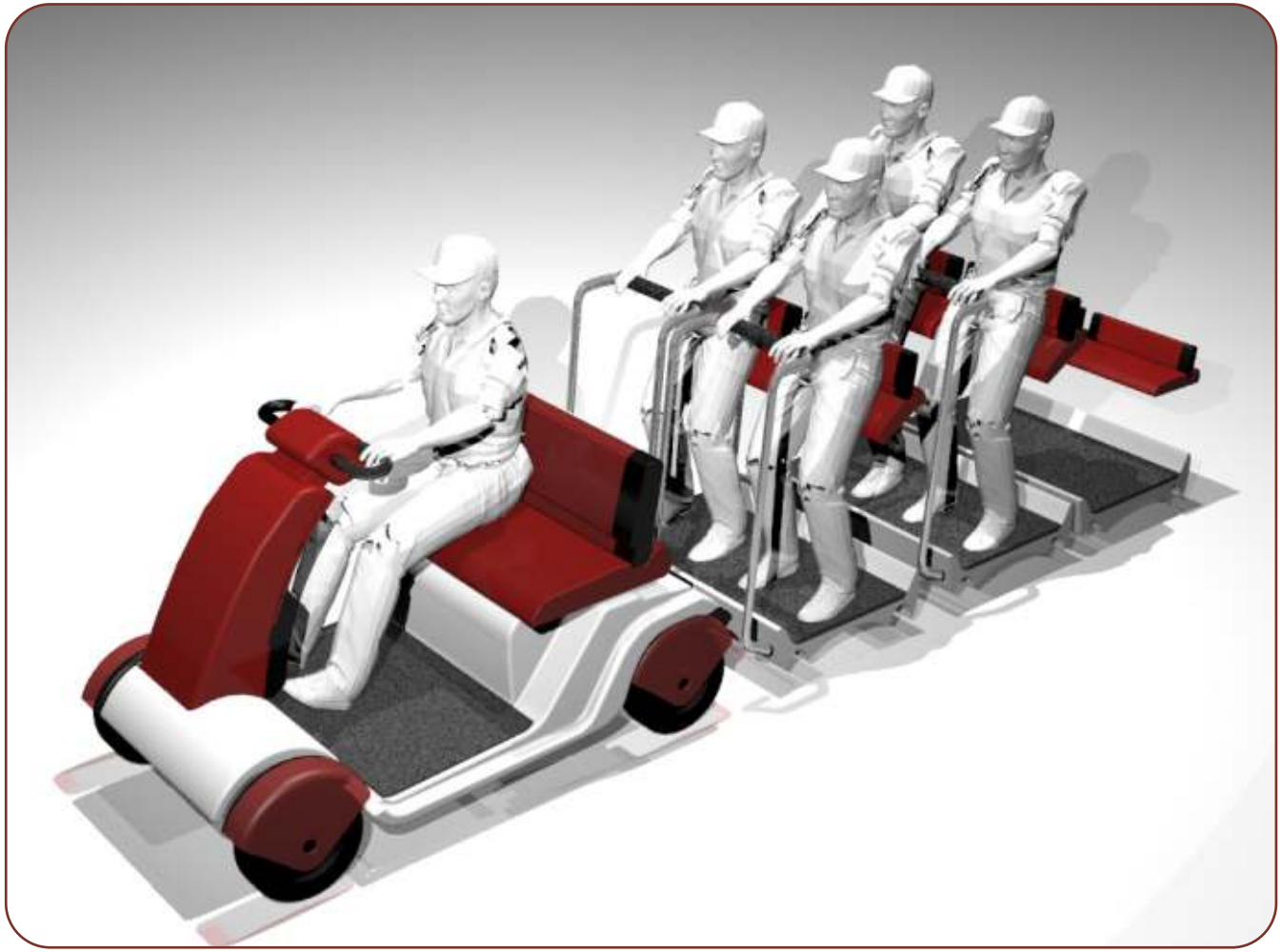
Concept 2



Concept 3

| | | | |
|---|---|---|---|
| Utilities | 6 | 2 | 7 |
| Aesthetics | 5 | 6 | 6 |
| Applications for the context | 4 | 6 | 8 |
| Compact | 3 | 6 | 6 |
| Flexibility during movement within the context | 3 | 3 | 3 |
| Total | 21 | 23 | **30** |

Ratings here tabulated are on a scale of 1 to 9 .1 being the lowest and 9 being the highest rank.
Since concept 3 has scored the highest rating ,this was selected for further development in terms of exploratory models and renderings.



As to drive the entire cart one has identified specifications and mentioned in product brief in the beginning chapters and so one has derived to the overall concept of the cart.

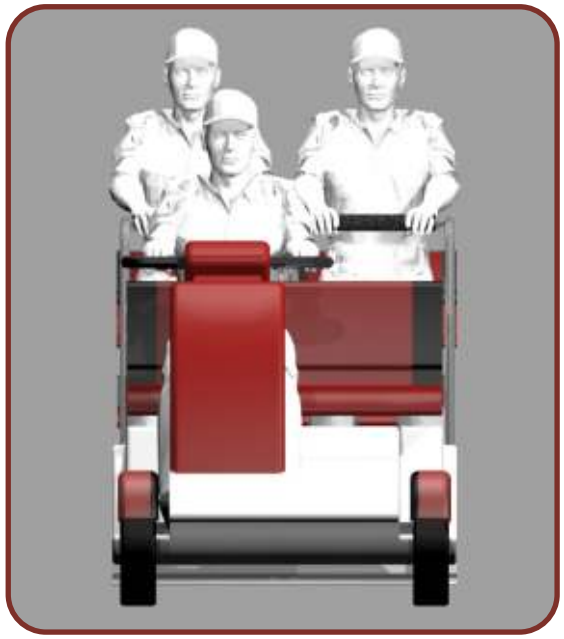
The batteries are provided below the seat of the driver and so it has more surface on the top that even one person can seat next to the driver .the space in front of the front seat is empty where there is a possibility to provide a storage space to put stuff like small bag or a bottle holder.

Image explains about the temporary support provided to the people at the back side and a handle in the front .

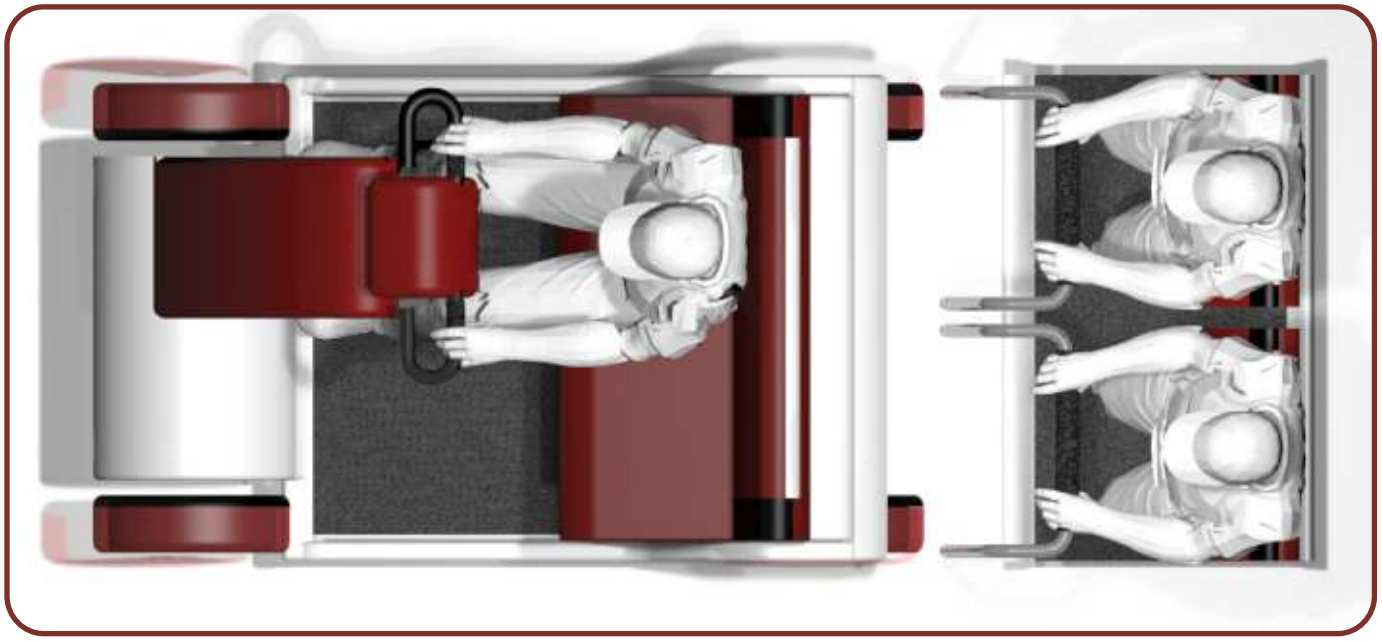
The grip is provided on the handle in the showed in the image.

On the base of the each module there is a mat provided for better grip below the feet

All the trolleys where passengers are standing on is adjoined to each other with a flexible joint so that it can easily take turns.The turns can be controll that it dosent turn more



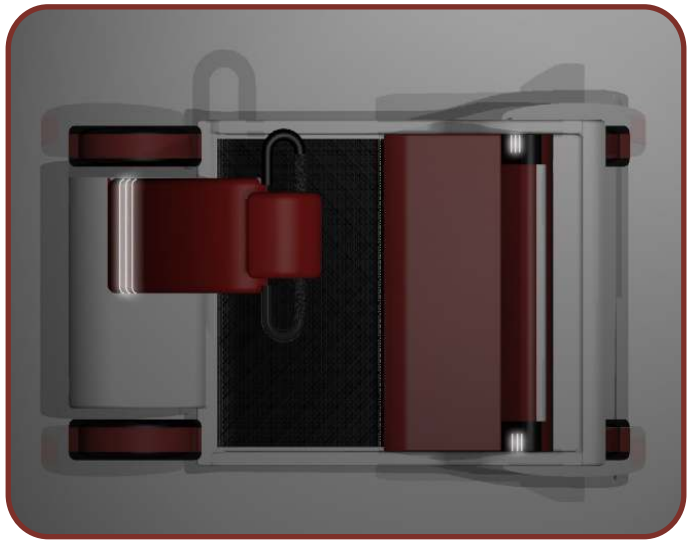
Front view



Top view

Driver's seat position is lowered to enhance visibility of passengers seated behind
Three permutations are possible with this module:
Front view of the vehicle shows that the people standing behind has more visibility and so they have better view of the shops within the super mall.

- Spacious platform along with the provision for one physically challenged passenger on a wheelchair / passenger with shopping cart or baby stroller
- Two-seater design with provision for storage of shopping bags in front
- Two passengers standing / half-sitting with provision for storage of shopping bags in front

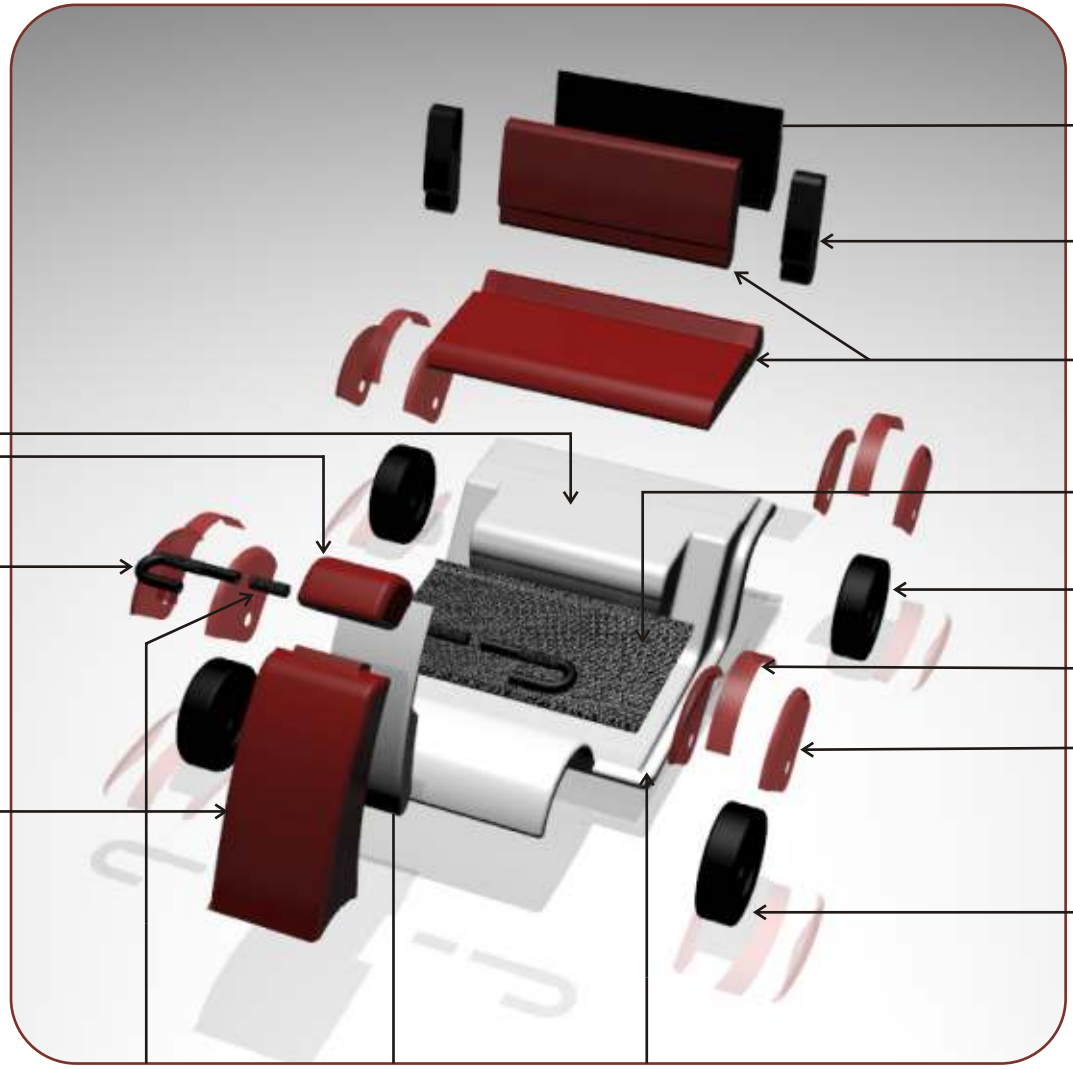


**Lighting possibilities**

All the options for the lighting are showing various possibilities of application of the lighting

After the study one has identified few characteristics of the malls where one of the important aspect of the mall is lighting and so one has tried out various places where the application of LED light can be done.

Considering the fact that the lighting qualities within the super mall is very bright one may not need many of the lighting applications. And so it has become more of an aesthetical element then a functional need of it



Roto molded back rest panel

Adjustable arm rest which can be fold flushed to the back rest when not in use .-Black

Molded high density foam for seating and back rest-Mat red

Control display
Assembly panel

Rubber mat at the leg space

Steering handle bar
With brake assembly

Rear castor wheels

Upper most layer of the fender as a styling element to cover the wheel

Wire housing,
Covering column
Structure

Fender on the vehicle for safety purpose
-Translucent red

Rubber tyre :12" dia

Rubber grip

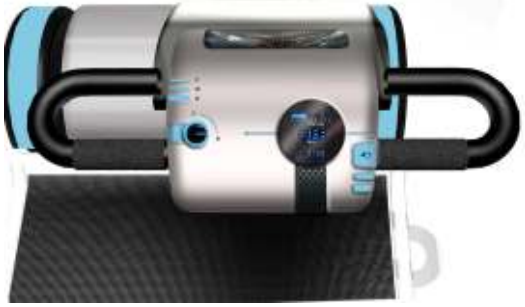
Storage compartment

ABS roto molded base (main body)
-White

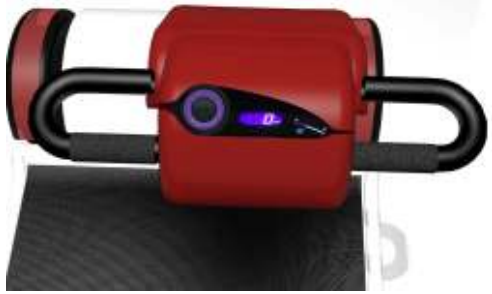
- Rubber flooring for better grip
- Castor wheels for better movement
- Long handle bar explored for holding while standir

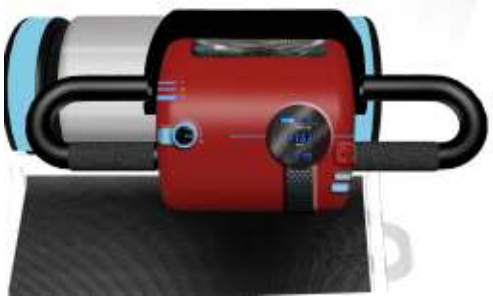
- Storage space in front for the shopping bags
- Display LCD panel for realtime information of offers and news updates
- Half sitting posture acquired with bottom- rest
- Gripping surface for safety while riding

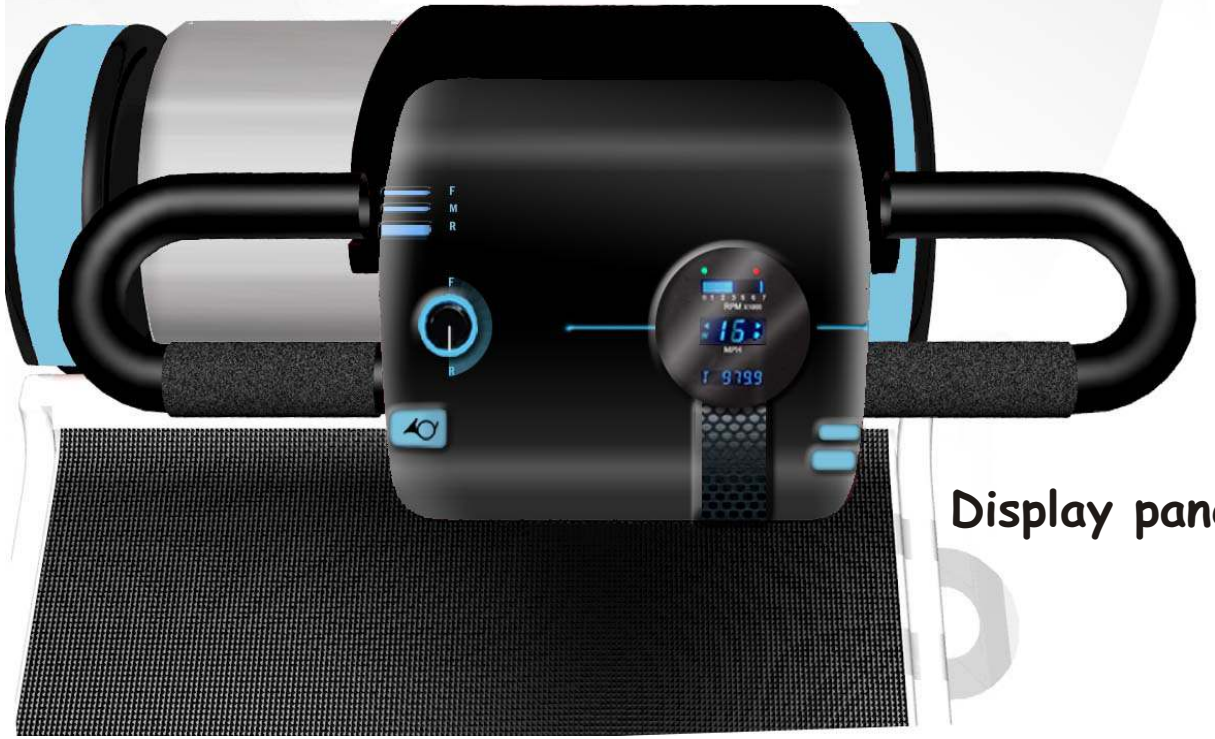

- Realtime digital display for advertisements and special offers at various outlets
- Map of ZONES in a mall to help user know different areas
- On-going announcements for specific drop-point stops
- STOP button to indicate to the driver to halt at the next drop point



New features were added after the user study:
Introduction of the speedometer
Internal communication system – to communicate with security staff as well as pick-up points
Easily visible battery - power indication
Reverse – forward knob
Handle bar form - with throttle in grips

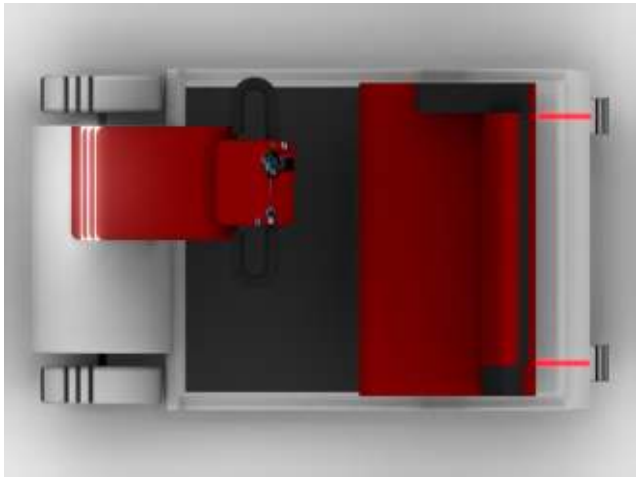






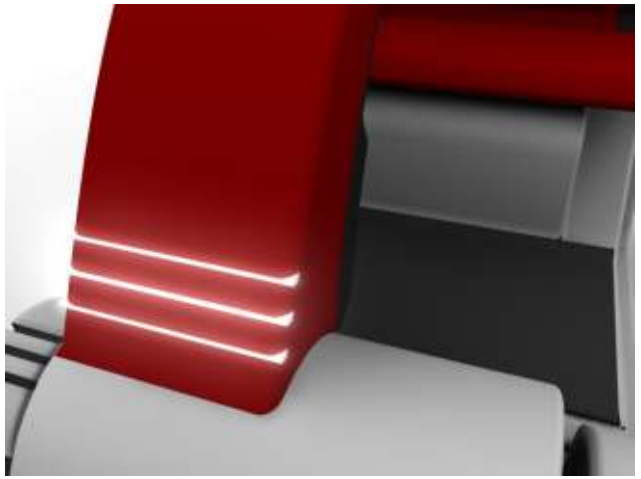

**Display panel**

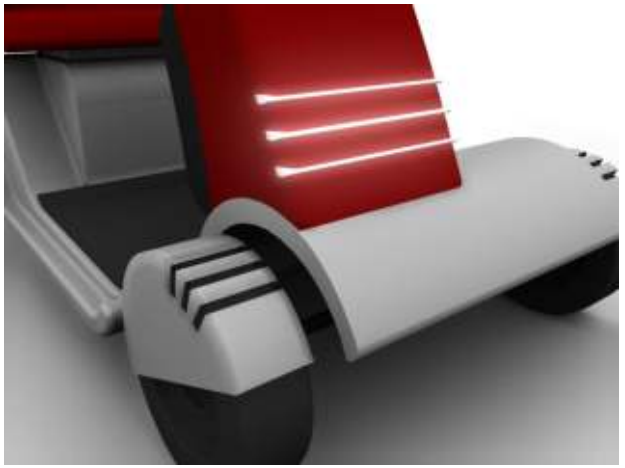
- Easily accessible horn button
- 3 indicators which glow for stopping at desired drop-point
- Time indicator for driver's information
- Two-way wireless communication system which reduces ambient interference – for clear announcements



Break away from the typical steering wheel – identity of a BEV
Flexible steering column to adjust to different drivers who use the car
Easy access to the battery placed under the driver's seat
Seats are upholstered in rexin for easy maintenance
Assuming that floor levels are even, the decision to lower the ground clearance making it inviting and easily accessible
Owing to meandering paths, the use of castor-design wheels aids in flexible movement
Steering column acts as surface for publicity / monogram

Provision of a fold-down armrest gives a psychological assurance in this open design of the car.
Driver is provided with storage space for his personal articles.

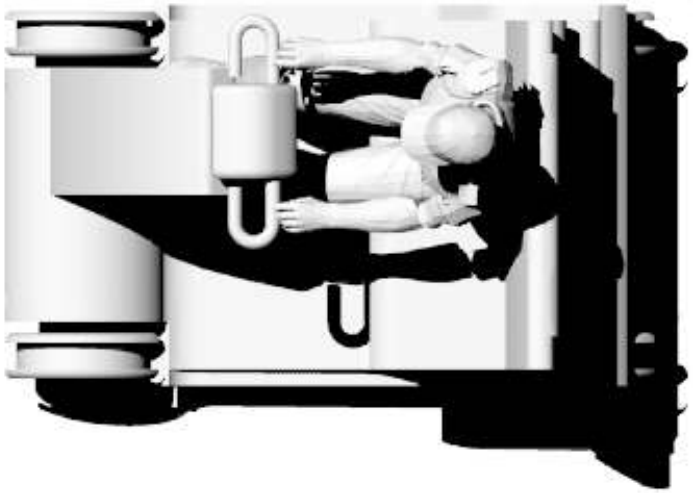




LED lighting  panels used for front cowl to break the visual vertical monotony and it follows the same language of the other elements like the fenders.
Keeping in mind the "light pollution" at these malls, LED's were employed
LED's have lesser electrical consumption and are more durable

final model :scale 1:5
front cart -driver seat and 2nd most cart for people who are going to stand on it
the third most cart is for aged people or peole who wants to travel seating

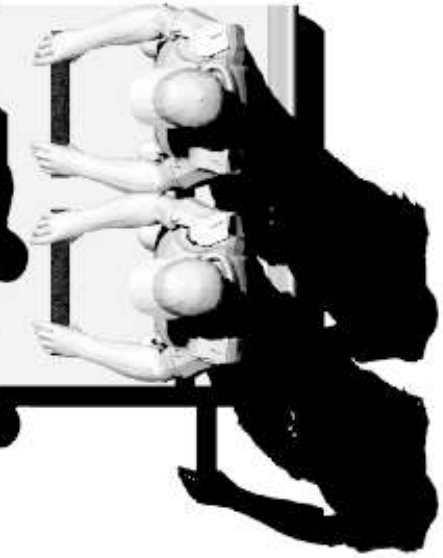
Driver seat

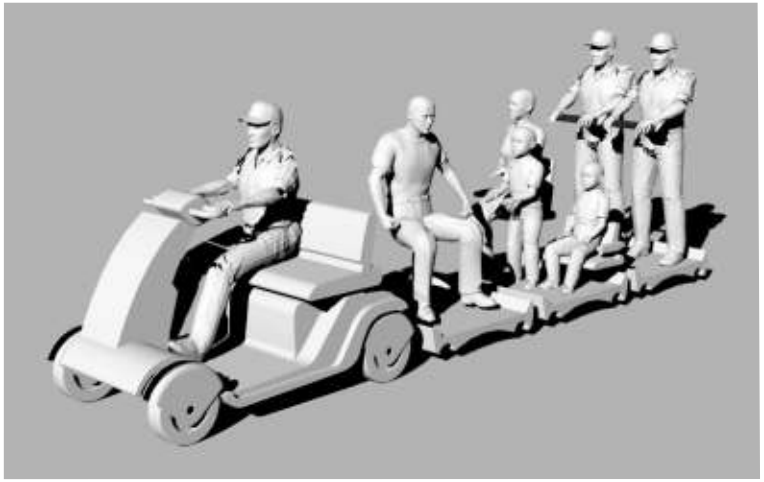


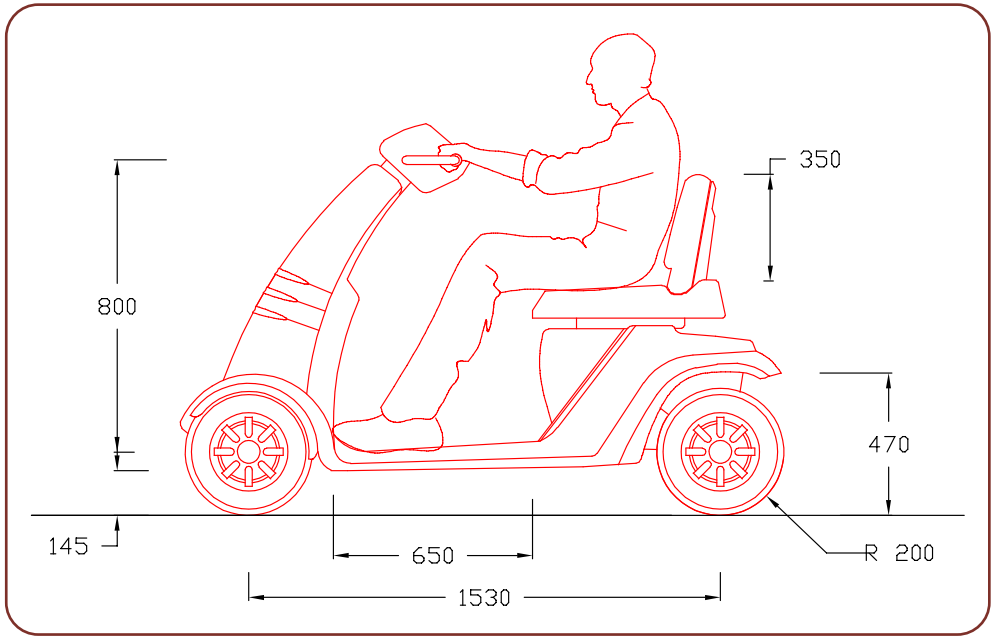
A person on a wheel chair

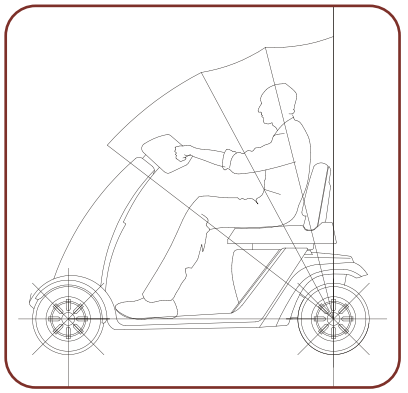
Kids with the parents

Standing

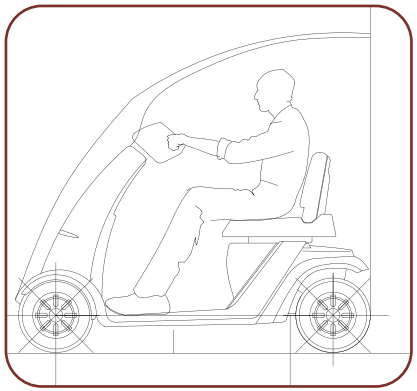






Retractable canopy

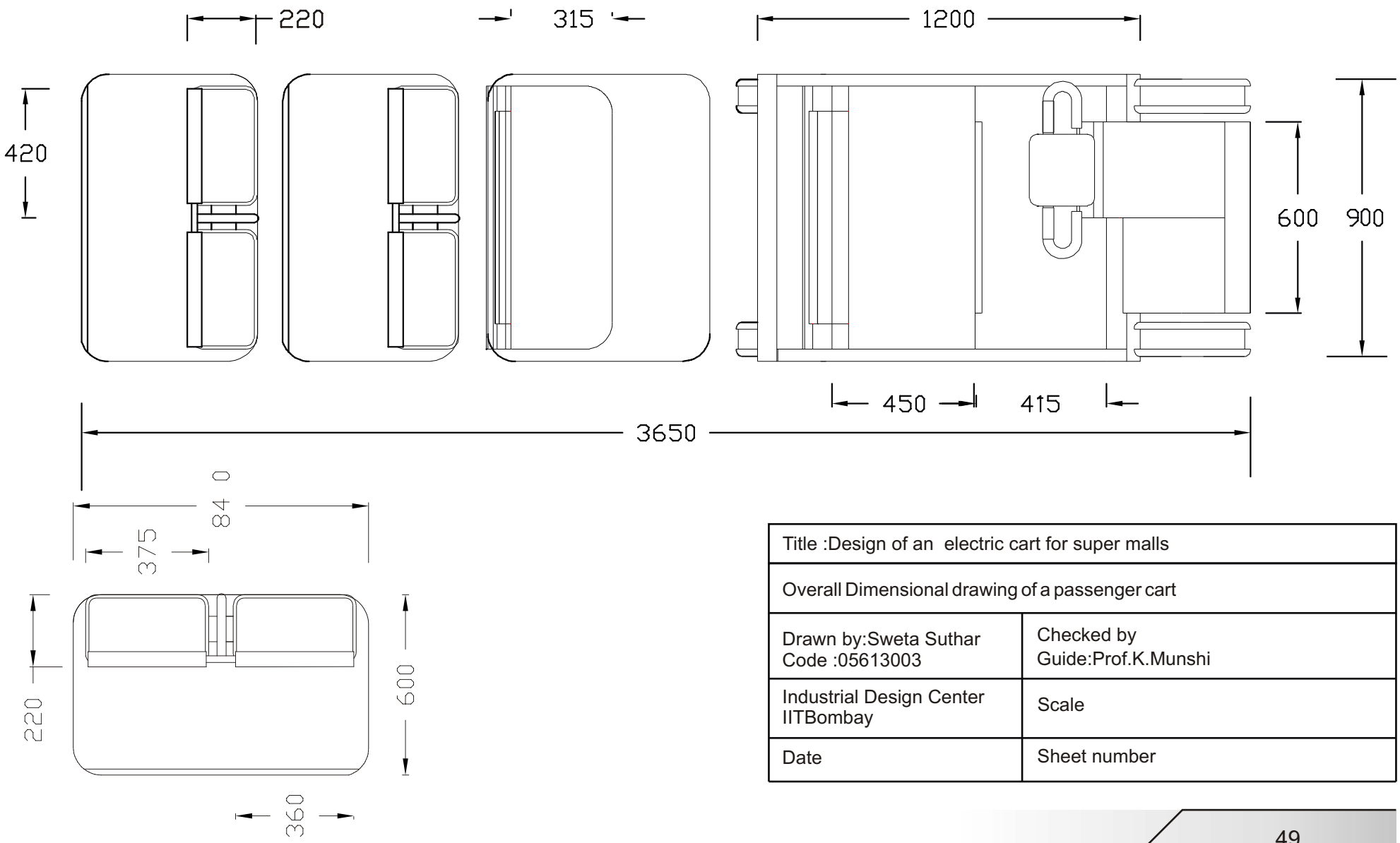


A shell made of acrylic

Various possibilities tried out for covering up the car either a collapsible kind of roof or a cover made out of acrylic sheet.

As the vehicle is going to be used in indoor environment roofing or any kind of covering is not required

| | |
|---|---|
| Title :Design of an electric cart for super malls | |
| Overall Dimensional drawing of a passenger cart | |
| Drawn by:Sweta Suthar<br>Code :05613003 | Checked by<br>Guide:Prof.K.Munshi |
| Industrial Design Center<br>IITBombay | Scale |
| Date | Sheet number |




| | |
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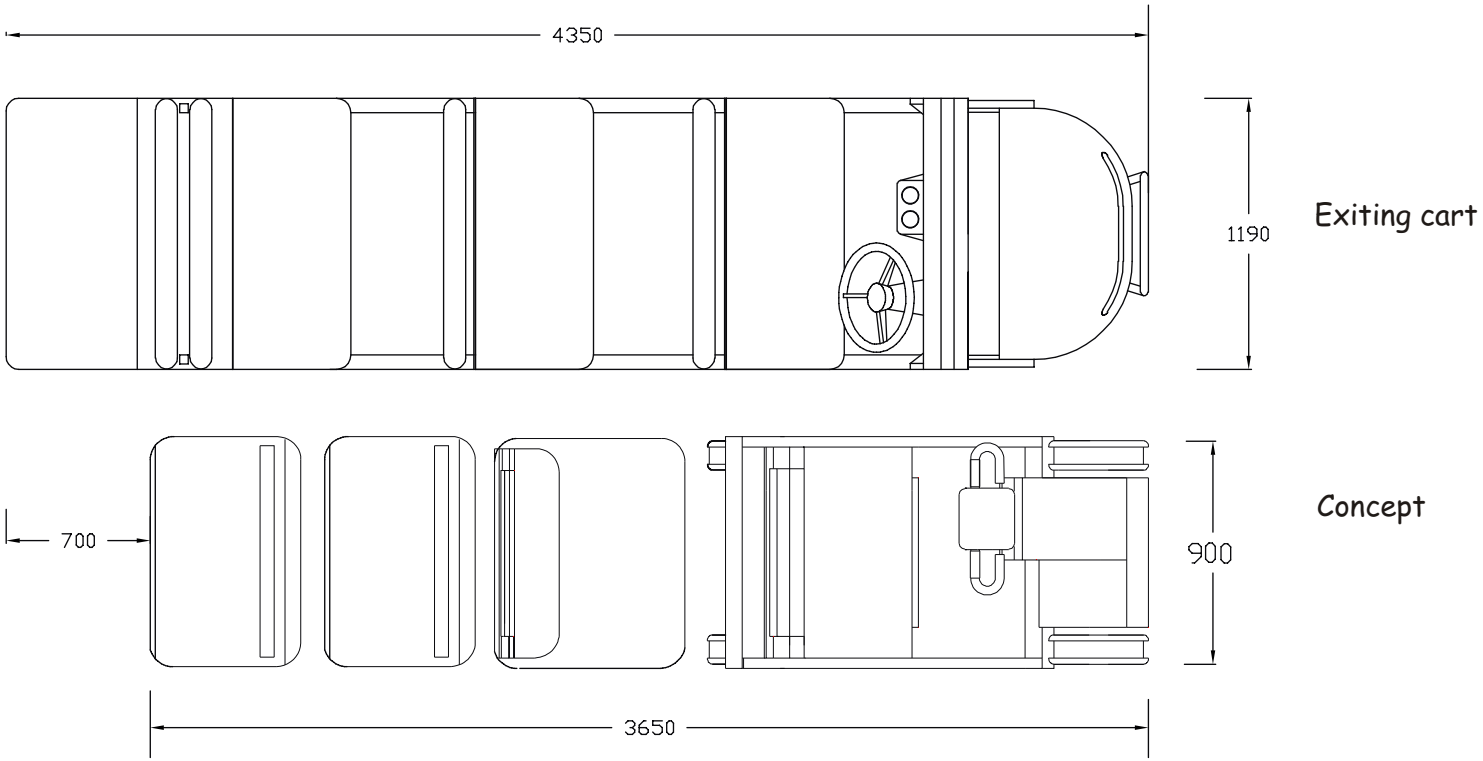


As per the product brief one is trying to make the design ,compact and easy enough to move through the traffic within the mall .

The drawings explains about the length and the width of the concept cart are lesser then the existing one.

Referring to human anthropometric data, basic dimension of the space requirement were fixed.

| | |
|---|---|
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*"First there was the shop, then the store, then the supermarket, and now the mall and the hypermarket. Malls have become urban India's homage to " progress "*

**-GEETA RAO**

*"The next generation of malls won't be defined by their size, but by the specialized services they offer"*

**-GEETA RAO**

**Bangalore**

- Bangalore Central
  - Garuda Mall[1][2][3][4][5][6]
  - Gopalan Mall
  - Sigma Mall[7][8][9][10][11]
  - SKC Mall
  - Swagath Mall (upcoming)
  - The Forum
  - Eva Mall.

**Chennai**

- Abirami mega mall
  - Alsa Mall[12]
  - Chella Mall[13]
  - Chennai Citi Centre
  - Fountain Plaza[14]
  - Globus
  - Ispahani Centre[15]
  - Kasi Arcade[16]
  - Maayajal
  - Prince Plaza[17]
  - Raahat plaza
  - Spencer Plaza[18]

61.16.237.27 12:39, 11 April 2007 (UTC)==Kanpur== 5.*Rave 3 a shopping plaza with multiplex (more information at http://www.propertiesindia.com)

- The Mega Mall, Adjacent to The City Center, The Mall, Kanpur, 208001.
  - Rave @ Moti, a shoping mall with a cineplex, Sarvadaya Nagar Kanpur.

**Gurgaon**

- DLF City Center Mall[19]
  - DLF Grand Mall[20]
  - DLF Mega Mall[21]
  - DLF Star Mall[22]
  - Galaxy Mall[23]
  - Gold Souk Mall[24]
  - Mall of India
  - MGF Mega City Mall[25]
  - MGF Metropolitan Mall[26]
  - Sahara Mall[27]
  - SRS Mall[28]
  - Raheja Mall Gurgaon
  - The Wedding Mall Gurgaon
  - **Source:** Shopping Mall Guide of Gurgaon
  - **Source:** Commercial Listing of Gurgaon Malls

**Hyderabad**

- Atria mall
  - Amrutha mall
  - Babukhan Mall
  - Brand Factory
  - City Centre
  - CMR Shopping mall, RP Road, Secunderabad
  - GVK One
  - Hyderabad Central
  - Lifestyle
  - Metro
  - MPM mall
  - Prasad's Entertainment
  - Rainbow mall
  - Sanali mall
  - SKC Mall, Parklane, Secunderabad
  - Swapnalok complex

**Lucknow**

- Citi Mall, Gomti Nagar(upcoming)
  - Express Walk, Rana Pratap Marg(upcoming)
  - Fun Republic Mall, Gomti Nagar
  - Landmark Arcade, Nishatganj
  - Sahara Ganj, Hazratganj
  - Singapore Mall cum Multiplex, Gomti Nagar(upcoming)
  - Tej Kumar Plaza, Hazratganj
  - Wave, Gomti Nagar
  - River Side mall,Gomti Nagar(upcoming)
  - Shalimar Mega Mall,Hzaratganj(upcoming)

**Mangalore**

- Bharath Mall, Bejai, Opp. KSRTC
  - Empire Mall, M.G.Road
  - Saibeen, M.G.Road
  - The Forum, M.G.Road (upcoming)
  - Excel Mall, K.S.Rao Road (upcoming)
  - Time Square, Kadri(upcoming)
  - City Centre Mall, K.S.Rao Road (upcoming)
  - Mischief Mega Mall, K.S.Rao Road (upcoming)
  - Pio Mall, Kodailbail/Karangalpady (upcoming)

**Mumbai**

- Atria Mall
  - Centre One
  - Citimall
  - CR2
  - Crossroads Mall (Mahalaxmi-Haji Ali)
  - Fun Republic (Andheri-W)[29]
  - Galleria
  - Heera Punna (Mahalaxmi-Haji Ali)
  - Highstreet (Phoenix Mills)
  - Huma Mall
  - Infinity Mall (Andheri-W)
  - Inorbit Mall (Malad-W)[29]
  - Inorbit (Vashi)
  - Inox
  - Lokhandwalas Open Air Mall
  - Nirmal LifeStyle (Bhandup-W)[29]
  - R-Mall (Mulund-W)[29]
  - Raghuleela (Kandivali-W)[29]
  - Raghuleela (Vashi)
  - The Hub

**New Delhi and NCR**

- Ansal Plaza
  - Center Stage Mall, NOIDA
  - East Delhi Mall
  - Lifestyle (mall)|Lifestyle]], Rajauri Garden
  - North Square Mall, Pitampura
  - **Source:** Shopping Mall Guide of Delhi

**Pune**

- Pune Central
  - Nucleus Mall
  - Magnum Mall
  - Connaught Place (Under Construction)
  - ICC High Street
  - Lifestyle
  - Pyramids
  - Ozone

**Udaipur**

- RKay Mall
- The Celebration Mall

**Vadodara**

- Vadodara Central
- Inox
- Seven Seas

Larger supermarkets in North America and Europe typically sell many different types of items, such as:

- Alcoholic products (where provincial/state and/or local laws allow; individual state and province control as to beer, wine,)
- Baby food and products
- Bakery
- Books, newspapers, and magazines, including supermarket tabloids
- Car care products
- CDs, DVDs, and videos (including video rentals)
- Confectionery
- Cosmetics
- Clothing and footwear
- Cereal
- Dairy products
- Diet foods
- Electrical items
- Feminine hygiene products
- Financial services (mortgages, credit cards, savings accounts, wire transfers, etc.)
- Flowers
- Frozen foods
- Fruits and vegetables

Greeting cards

Housecleaning products

Luggage

Lottery tickets

Meat

Medicines and first aid items (mostly over-the-counter, some supermarkets have pharmacies)

Non alcoholic beverages, such as refreshments and water

Personal financial products

Personal hygiene and grooming products

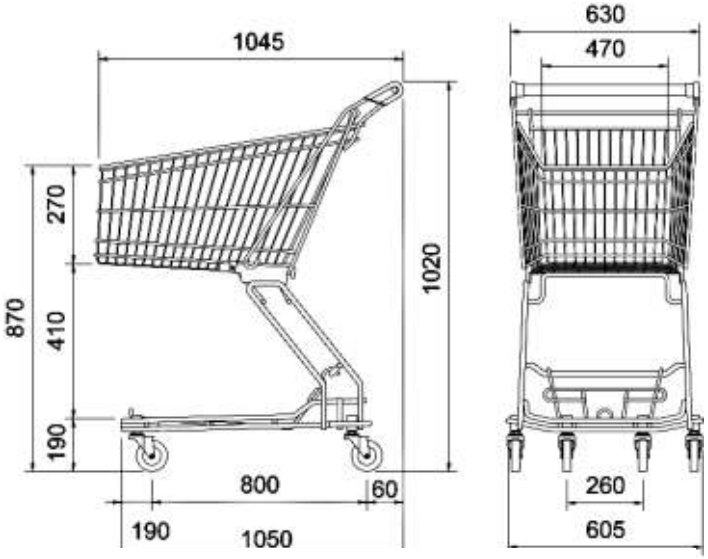
Pet foods and products

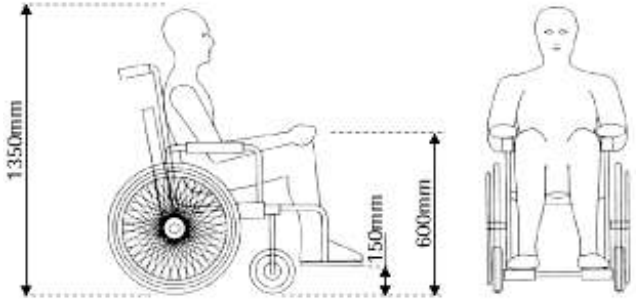
Snacks

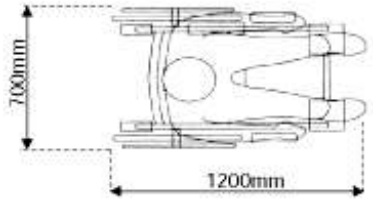
Toys

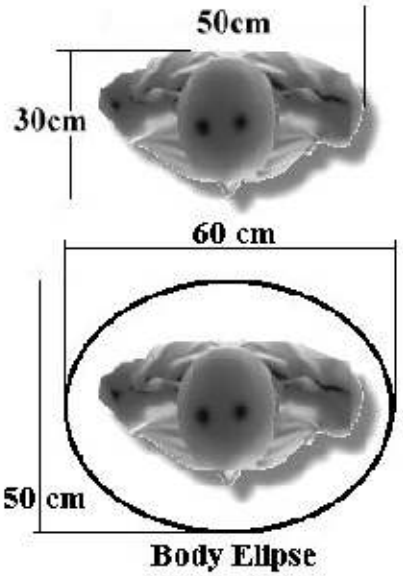
Design of an Electric cart for airport terminal use
Industrial design project III
Jitesh . R 03613004

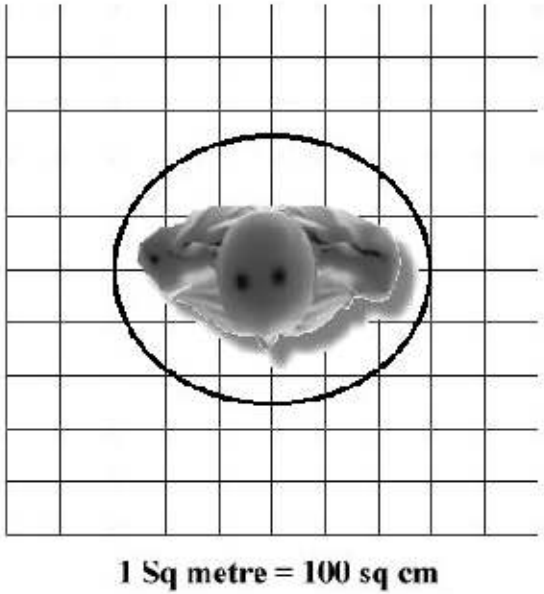

http://auto.howstuffworks.com/electric-car.htm
http://en.wikipedia.org/wiki/List_of_shopping_malls_in_India#_note-bombay-india
http://en.wikipedia.org/wiki/Hypermarket
http://www.mainimaterials.com
http://www.kingtire.com
Www.magnusinc.com/.../Food_Service_Casters.asp
http://www.cascocart.com/steering.html
http://www.cascocart.com/index.htm

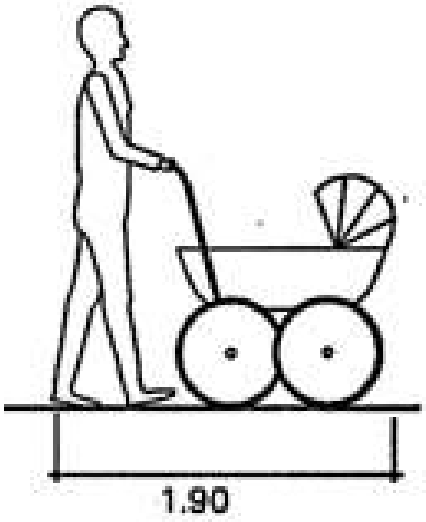

1045
630
470
270
870
410
190
1020
800
60
190
1050
260
605


1350mm
150mm
600mm


700mm
1200mm


50cm
30cm
60 cm
50 cm
Body Ellipse


1 Sq metre = 100 sq cm


1.90